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UNIVERSITY OF PENNSYLVANIA

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STANDARDIZED EXERCISES IN UNITED  
STATES HISTORY.  
COLONIAL PERIOD

BY  
STURGISS BROWN DAVIS

A THESIS  
PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF PITTSBURGH PRESS  
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# STANDARDIZED EXERCISES IN HISTORY

## INTRODUCTION

There are now available for the use of teachers a number of standardized tests in United States History. All of these tests cover in a general way the whole period of history and are especially useful for survey work. There is need, however, of a different kind of test for supervisory purposes which shall include the many details of a single period of history and at the same time lend itself readily for diagnostic purposes. Such tests have been devised and are here presented as one more means of determining scientifically the attainment of pupils in this subject.

The plan used in standardizing the material of tests is given in more than usual detail in the hope that teachers of history and supervisory officers may be able to profit by the experience of the writer and extend the work here started. Care has been taken to exercise simplicity and directness at all times so that the student who is just beginning research work in education may find directly or indirectly answers to questions of statistical procedure.

Briefly the study was carried out as follows: After determining tentatively the aims and limits of the investigation, the material to be standardized was selected from a source of unquestioned value. This material was then put in the form of exercises to be worked out by pupils. The responses of these pupils were then scored, tabulated, evaluated, and finally weighted in terms of the functions of the Normal Frequency Curve. These weightings confirmed the belief in the possibility of classifying the exercises into tests and scales. They also showed that there are four distinct types of historical material, characterized by the difficulty pupils have in comprehending them. Such classifications were made both in form and content. While these classifications are correct theoretically it was deemed wise for practical purposes to consider only the approximate weighting of each exercise and to reclassify all the standardized material into two tests. In this form some accuracy was sacrificed but the reliability for supervisory purposes is just as valid. A Teacher's Manual was prepared which gives full directions for administering, scoring and using the results of the two tests formulated for school use.

The execution of this plan would not have been possible without the hearty co-operation of teachers of history, supervisors, and students of education. There was the most cordial response at all times and I wish here to express my appreciation of all the assistance I received however inconspicuous it may have seemed to the one giving it.

Such general acknowledgment, however, is not just regarding the sympathetic guidance and suggestions I received from Dr. Harlan Updegraff of the University of Pennsylvania. He suggested the intensive study of the Colonial Period, and the distinctive source of the content of the exercises. He also gave me the benefit of many constructive criticisms before the manuscript was presented for publication.

To my fellow students of the seminar group in Educational Administration at the University of Pennsylvania, I am indebted in more ways than I can express in a formal work of this kind. However, it should be said that the constructive criticisms and pointed suggestions which they offered when the reports of progress were made from time to time on this study, served as a valuable check against biased thinking and as a stimulus to merit their approbation.

#### PURPOSE OF THE STUDY

The purpose of this study has been the derivation of standardized testing material in United States History comparable in exactness with the contents of such material as the Monroe Reading Test, the Buckingham Spelling Scales, and the Ayres Handwriting Scales. The hypothesis was maintained that it is just as possible to measure certain aspects of content subjects, such as history, as it has been found to be possible to measure the attainments of pupils in the form subjects just mentioned.

#### Limits of the Investigation

For the purposes of this study and under the conditions it had to be pursued, it was deemed advisable to circumscribe the field of investigation, and to limit the method of work. Only in this way did it seem possible to secure reliable results in a field so little known. After a careful consideration of the possibilities of the situation the following limits were determined:

1. *Informational Material.* The content of the proposed tests should be confined to the informational aspect of the instruction in United States History. Full and due consideration was given to the other aims in teaching history, but the attainment of information was considered fundamental to the other aims. Dewey has shown clearly that information is one of the prerequisites to sound thinking on any problem. It seemed evident also that this aim could be measured more definitely than the other aims such as citizenship, open mindedness, method of thinking, etc.

2. *One Period of United States History.* The informational material used for the tests should be limited to a certain period of history, or a cross section of the whole course of study. It was thought that the material of a given period would be more homogeneous and could be handled more accurately. The Colonial Period was chosen because it has always been taught rather thoroughly in schools, and abounds in informational matter. There seems to be a need also for a series of tests each based upon a single period of United States History for the use of supervisors after a class has been given the usual school instruction.

3. *A Regular Form.* The information used for the testing material should be cast in a certain form in order that the scoring might be objective, and at the same time secure the probability of consistency and uniformity in preparing the tests, and the responses of pupils. Such uniformity would also be likely to economize time.

4. *Eighth Grade Pupils.* The tests should be administered only to the advanced division of pupils in the Eighth Grade. The purpose in confining the data to this class of pupils was to find out as nearly as possible the net results of school instruction relating to historical information. The belief was maintained that whatever information pupils had, at least one year or more after completing the course in the Colonial Period, represented material which is easily comprehended and retained; conversely, that material which is difficult to learn would either be wanting or so vague in the minds of the pupils as to be lacking for ready command.



## CHAPTER I

### THE SELECTION AND ORGANIZATION OF THE MATERIAL TO BE STANDARDIZED

After the purposes and limits of a study of this kind have been determined the next points to be considered are the source of material and the form in which the content is to be placed. Unless this is done the investigator must be prepared to expect all sorts of irregularities in the responses of pupils.

SEC. 1.—*Content of the Exercises.* The reliability of the responses of children as data for standardizing material of instruction is in proportion to the opportunity children have had to learn the content of the test. The difficulty of finding such material for this investigation was solved by the use of the very careful study by Bagley and Rugg. This study appeared as Bulletin No. 16 of the School of Education of the University of Illinois. The authors took twenty-three American Histories then in common use and made a statistical study of the amount of space devoted to the different topics, "common to at least seventy-five per cent. of the books" and additional topics "common to at least fifty per cent. of the books." Tables V and VIII of Bulletin No. 16 include topics devoted to the "Period of Colonial Settlement and Development" and to the "Colonial Wars." The topics in these tables form the source of the content of the exercises used in this study. As the study progressed it was evident that additional exercises could be devised which were entirely within the range of pupils' interests, and as fair to them as the exercises based upon topics taken directly from the Bagley and Rugg study. The answers to these exercises were all taught in school in some form though seldom if ever asked for directly. The ability to work them out was more of an application of common sense in using the facts already acquired. The following is a typical illustration: "By the time the Mayflower had arrived at Plymouth Rock it had crossed the *Atlantic, Antarctic, Arctic, Indian, Pacific ocean.*" "By the opening of the Revolutionary War the number of colonies had increased to *twelve, thirteen, fourteen, fifteen, sixteen.*" Since these exercises were worked out successfully by a large percentage of the pupils tested, and no objection was raised by teachers, the

author believed he was justified in including them and others of the same type. (Copy of Test I is shown beginning on page 18.) To aid the reader in gaining a more adequate conception of the wide range of information required to work out intelligently the exercises of Test I the following classification of the items of information is here submitted:

#### NOTED CHARACTERS

- |               |                |                |
|---------------|----------------|----------------|
| 1. Andros     | 15. Davenport  | 29. Mather     |
| 2. Argall     | 16. Delaware   | 30. Oglethorpe |
| 3. Baltimore  | 17. Dixon      | 31. Penn       |
| 4. Berkley    | 18. Edwards    | 32. Pocahontas |
| 5. Berkeley   | 19. Endicott   | 33. Powhatan   |
| 6. Bacon      | 20. Gorges     | 34. Rolfe      |
| 7. Bradford   | 21. Hooker     | 35. Say        |
| 8. Brewster   | 22. Hutchinson | 36. Smith      |
| 9. Calvert    | 23. Kieft      | 37. Standish   |
| 10. Canonicus | 24. Leisler    | 38. Stuyvesant |
| 11. Carteret  | 25. Locke      | 39. Williams   |
| 12. Charles   | 26. Mason      | 40. Winthrop   |
| 13. Claiborne | 27. Massasoit  | 41. Yeardley   |
| 14. Dale      | 28. Minuit     |                |

#### RELIGIOUS SECTS

- |                   |                        |
|-------------------|------------------------|
| 1. Baptists       | 7. Moravians           |
| 2. Catholics      | 8. Pilgrims            |
| 3. Episcopal      | 9. Puritans            |
| 4. Dutch Reformed | 10. Quakers            |
| 5. Huguenots      | 11. Congregationalists |
| 6. Methodists     |                        |

#### COLLEGES

- |            |                     |
|------------|---------------------|
| 1. Brown   | 4. Princeton        |
| 2. Harvard | 5. William and Mary |
| 3. Penn    | 6. Yale             |

#### EARLY LARGE CITIES

- |               |                 |
|---------------|-----------------|
| 1. Baltimore  | 4. Philadelphia |
| 2. Boston     | 5. New York     |
| 3. Charleston |                 |

#### NATIONALITIES

- |            |            |
|------------|------------|
| 1. Dutch   | 5. Irish   |
| 2. English | 6. Scotch  |
| 3. Germans | 7. Spanish |
| 4. Indians | 8. Swedes  |



### DATES

- |         |          |
|---------|----------|
| 1. 1607 | 6. 1733  |
| 2. 1619 | 7. 1754  |
| 3. 1620 | 8. 1775  |
| 4. 1643 | 9. 1787  |
| 5. 1683 | 10. 1789 |

### LEGAL TOPICS

- |                          |                          |
|--------------------------|--------------------------|
| 1. Bacon's Rebellion     | 11. Aristocracy          |
| 2. Charter Oak           | 12. Autocracy            |
| 3. Charter Colonies      | 13. Oligarchy            |
| 4. Claiborne's Rebellion | 14. English Crown        |
| <i>Colonial Wars</i>     | 15. Continental Congress |
| 5. Anne                  | 16. Grand Model          |
| 6. William               | 17. Great Treaty         |
| 7. George                | 18. Mason and Dixon Line |
| 8. French and Indian     | 19. Royal Government     |
| 9. Democracy             | 20. Toleration Act       |
| 10. Monarchy             |                          |

### EARLY COLONIES

- |                   |                    |
|-------------------|--------------------|
| 1. Connecticut    | 8. New Jersey      |
| 2. Delaware       | 9. New York        |
| 3. Georgia        | 10. Pennsylvania   |
| 4. Maryland       | 11. Rhode Island   |
| 5. Massachusetts  | 12. South Carolina |
| 6. New Hampshire  | 13. Virginia       |
| 7. North Carolina | 14. Maine          |

### MISCELLANEOUS

- |                           |                            |
|---------------------------|----------------------------|
| 1. Boston News Letter     | 12. Patroons               |
| 2. City of Brotherly Love | 13. Plymouth Rock          |
| 3. Debtors of England     | 14. Poor Richard's Almanac |
| 4. First Colony           | 15. Preachers' Influence   |
| 5. Indigo                 | 16. Rice                   |
| 6. Indentured Servants    | 17. Slaves                 |
| 7. Holy Experiment        | 18. Tobacco                |
| 8. Last Colony            | 19. Witchcraft             |
| 9. Log House              | 20. Jamestown              |
| 10. Mayflower             | 21. Corn                   |
| 11. New England           | Total 136                  |

SEC. 2.—*Form of the Exercises.* After the content of the testing material had been decided upon it was necessary to consider the form in which it should be put. The responses of pupils had to be evaluated in an objective manner.

The studies of Starch, Monroe, Kelly and others all show how variable are the marks of teachers if there is opportunity for a difference of opinion. The ordinary "question and answer" method of testing pupils was at once discarded for the usual difficulties would be inevitable. Either doubtful or partial answers would have to be accepted or the content be limited to those few points about which teachers and pupils readily agree there can be but one acceptable answer, such as dates.

The "completion blank" form was considered and tried in a preliminary test. It was not found satisfactory, for either the possible acceptable answers had to be listed arbitrarily or a shifting standard constantly defended. It was noted also that pupils made wild guesses, and that it would be very difficult to frame up statements which did not admit of two or more interpretations. One has but to try this plan to see how ingenious pupils are in inventing answers which represent a partial truth. At least they contain enough excellence for pupils to stand up and defend their answers.

A cancellation test suggested from those used in psychological work was tried, but rejected because of the unnecessary length of time required to indicate the correct answer.

Finally it was decided to put the desired response in each case along with seemingly correct responses and ask the pupils to indicate in some way their choice. At first they were asked to underscore the correct answer, but later it was found that it facilitated the scoring to have them draw a line clear around the correct one of the several suggested answers. A trial with this form proved satisfactory from the first. Pupils readily saw what was wanted, teachers approved it, and the grading was easily and objectively done.

As the work of forming the material into tests progressed it became evident that standards could be set up which if observed would greatly facilitate subsequent efforts in this line. The following were derived:

1. Instead of asking questions, make statements called "exercises" in History.
2. The form and content of these exercises should be unmistakably clear and as easy to comprehend as possible.

3. The vocabulary employed in the exercises should be such as is used in standard text books for elementary schools.
4. Sufficient suggested answers should be given to minimize the effect of chance selection.
5. An alphabetical arrangement of the suggested answers should be observed to avoid any constant error in placing of the correct answer.
6. Pupils should indicate the correct answer by drawing a line clear around it.
7. Any abbreviations used should be those in common use.
8. The answers offered should conform to the period under consideration.
9. The suggested answers should be made up of teaching material, and any one of them seem a plausible answer to one not informed on the subject. Absurd suggested answers defeat the plan.
10. The suggested answers should be so different from the correct one that any quibbling over partial truths is precluded.
11. It should be clearly understood that one answer and only one will be accepted as correct.
12. No exercise should be submitted unless there is reasonable evidence that pupils have had the opportunity to learn the facts needed.

The last five of these standards refer more specifically to content but were here included for convenience since both form and content must be considered together in making up testing material.

The term, "Exercises in History," was adopted because it seemed to be the most fitting one to use. The material was not put in the usual statement form and it was not in the form of questions. Pupils were accustomed to the word exercise as used in Arithmetic, Geography and Language. In each of these instances there was an answer to find. The situation is similar in the Exercises in History. A number of answers are given and the pupil is expected to find the correct one.



## CHAPTER II

### STANDARDIZING THE MATERIAL

SEC. 1.—*Procedure Followed.* Having determined the content and the form of the testing material it was next necessary to determine the specific and relative difficulty of each one of the exercises. Two plans have been used by research students in standardizing material. One plan is to obtain the combined judgment of teachers whose experience and training seemingly qualifies them to render expert opinion as to the value of given questions, or the quality of work done by pupils. The Harvard-Newton Composition Scale and the Thorndike Handwriting Scale are outstanding examples of this plan as to quality of work. The other plan is to submit the material to pupils and grade the work according to standards acceptable to all. The assumption is made that, that material is easy which is easily, readily and correctly worked out; conversely, that testing material is difficult which is not easily, readily and correctly worked out by the pupils.

The second one of these plans was adopted for standardizing the historical material used in this study. Each of the exercises was then submitted to pupils of the eighth grade in well recognized public schools. Since the number of responses which were supposedly needed, was greater than the writer could procure from pupils directly, a form letter and directions for administering the test were prepared and sent out to the chief school official of the system from which data were desired. A copy of Test I was always included with the letter so the administrative officer could see just the nature of the data expected. There was a hearty response for co-operation in every instance. In so far as it was possible the writer administered the tests himself.

The form letter and directions for "Classroom Procedure" are as follows:

#### EXERCISES IN UNITED STATES HISTORY

##### COLONIAL PERIOD

To Teachers of U. S. History:

You are in a position to co-operate in an experimental study of the historical matter now generally taught in our Elementary

Schools. The Exercises herewith enclosed is the result of a preliminary study which, it is hoped, will result in definite suggestions for class room work.

Will you kindly assist in securing actual results from the pupils in your charge?

The appended Classroom Procedure for administering the Exercises, and the Directions to Pupils on the first page of the folders, are intended to make clear all necessary points. Please read these over carefully, and follow them as given.

The material readily lends itself to the game idea and it is suggested that it be so used. A correctly marked copy is enclosed for your own use. Please do not mark any of the pupils' work, however.

In working up the results of this study each school will be designated by number only. No personalities whatsoever will enter into the summary. The median score for all schools listed, and the median for your school will be sent you.

Your assistance will be greatly appreciated by those responsible for the results of this study. Return postage is enclosed to cover cost of all material sent out.

Address School of Education,  
University of Pennsylvania,  
Care of Dr. Harlan Updegraff,  
Box 11, College Hall.

#### CLASSROOM PROCEDURE

1. All pupils who are going to participate should clear their desks, and provide themselves with pencils.
2. READ TO PUPILS: "Today we are going to have a new way of finding out how many facts of the Colonial History of our country we know really well. In order that all may have the same opportunity of making a good score, no one should start the game until I give the signal. I shall now pass out the papers with the first page upwards. You may look at this but nothing more until I say, r e a d y."
3. Distribute the Exercises.
4. Direct the pupils to fill out the blanks at the top on the first page.
5. Read over with the pupils the illustrative exercises. If neces-

sary put one or more of them on the black-board and work them out so as to make sure pupils know exactly just what is to be done.

6. When all is in readiness for a period of uninterrupted work, say, Ready, GO!
7. Note down the time when the class begins working.
8. As the pupils hand in their papers put down the number of minutes each worked on the blank space for that purpose.

### Test I

## UNIVERSITY OF PENNSYLVANIA SCHOOL OF EDUCATION EXERCISES IN UNITED STATES HISTORY COLONIAL PERIOD

Directions to Pupils: Fill in these blank lines with:

Your name.....School.....

Grade..... City..... Date.....

Are you a boy or girl?.....

1. On the following pages are a number of exercises similar to these.
  - (a) Columbus discovered *Africa, America, Asia, Australia.*
  - (b) The American Revolution began in the year *1763, 1765, 1775, 1776.*
  - (c) The first American colony founded by the English was *Conn., Ga., S. C., Va.*
2. If you draw a line around the correct one of the several suggested answers in italicized letters for each Exercise, historical facts may be read as follows:
  - (a) Columbus discovered *America.*
  - (b) The American Revolution began in the year *1775.*
  - (c) The first American colony founded by the English was *Va.*
3. There is but *one correct* answer in each Exercise.
4. Try to find the correct answer in each Exercise whether you are sure of it or not.
5. Hand in your paper as soon as you have worked out all the exercises you can. Take as much time as you need, but no more.
6. Number of minutes you worked..... (Your teacher will note this.)

*Standardized Exercises in History*  
**HISTORY OF THE UNITED STATES**  
**COLONIAL PERIOD**

*Test I*

**EXERCISES**

1. The Mayflower was a *chapel, hall, hotel, plant, queen, ship.*
2. Miles Standish led in fighting the *Dutch, Indians, Puritans, Swedes.*
3. Roger Williams founded the colony of *Ga., Md., Mass., N. C., N. J., Pa., R. I., S. C., Va.*
4. The Patroons were Dutch *fishermen, fur traders, landowners, miners, preachers, teachers.*
5. Thomas Hooker led emigrants from Mass. to found *Conn., Del., Ga., Md., N. J., N. Y.*
6. The first college founded was *Brown, Harvard, Pennsylvania, Princeton, William and Mary, Yale.*
7. The Witchcraft delusion occurred among the *Baptists, Catholics, Dutch, Indians, Puritans.*
8. John Berkley and George Cartaret once owned *Conn., Del., Ga., Md., Mass., N. H., N. J., Pa.*
9. The principal native food crop was *barley, corn, oats, potatoes, rice, rye, wheat.*
10. The Mason and Dixon Line was established between *Pa. and Del., Md., N. J., N. Y., Ohio.*
11. Nathaniel Bacon led a Rebellion against the tyranny of Governor *Argall, Andros, Berkley, Dale, Minit, Winthrop, Yeardley.*
12. The Charter Oak was a *church, meeting house, painting, school, town hall, tree.*
13. The Grand Model was drawn up by *Cecil Calvert, King Charles, John Locke, John Smith.*
14. Of the nationalities represented in all the colonies the most numerous were the *Dutch, English, French, Germans, Irish, Scotch, Swedes.*
15. The Proprietary form of government was exercised in *Mass., N. Y., Pa., R. I., S. C., Va.*
16. The most influential professional class in New England were the *editors, lawyers, physicians, preachers, teachers, writers.*
17. The Toleration Act in Md. was decreed by the *Episcopalians, Catholics, Puritans, Quakers.*
18. To help the poor debtors of England James Oglethorpe founded the colony of *Conn., Del., Ga., Md., N. J., S. C., Va.*
19. The Pilgrims were kindly received by Chief *Canonicus, Massasoit, Philip, Powhatan.*
20. The first settlement by the Swedes was in *Conn., Del., Ga., Md., Mass., N. C., N. H., N. Y.*



21. Slavery was first introduced in 1607, 1619, 1620, 1643, 1683, 1775, 1787.
22. New York was founded by the *Dutch, English, French, Spanish, Swedes*.
23. The main export crop of early Va. was *corn, cotton, indigo, rice, tobacco, wheat*.
24. The Great Treaty was between the Indians and *Governor Berkley, John Endicott, Cotton Mather, William Penn, John Smith, Miles Standish*.
25. Pocahontas is said to have saved the life of *Sir William Berkley, Jonathan Edwards, William Penn, John Rolfe, John Smith*.
26. The Charter form of government was enjoyed by the people of *Del., Ga., Md., Pa., R. I., Va.*
27. The Huguenots first settled in *Baltimore, Boston, Charleston, New York, Philadelphia*.
28. The "Plymouth Rock" is in *Conn., Del., Md., Mass., N. J., N. Y., Pa., R. I., S. C.*
29. The first Pilgrims landed in 1607, 1619, 1620, 1643, 1683, 1776, 1789.
30. William Claiborne led a Rebellion against *Lord Berkley, Lord Brook, Lord Baltimore, Lord Delaware, Lord Say*.
31. Indentured servants and slaves were held mostly in *Del., Ga., Mass., Pa., S. C., Va.*
32. As Royal Governor of New England Sir Edmond Andros represented the *Continental Congress, the English Crown, the Proprietors, the Common People*.
33. The First Representative Assembly was held in America in 1697, 1619, 1620, 1643, 1754.
34. William Bradford was once Leader of the *Baptists, Catholics, Pilgrims, Quakers*.
35. The first settlement of the Catholics was in *Conn., Del., Md., Mass., N. C., N. H., N. J., R. I.*
36. Jamestown was founded in 1607, 1619, 1620, 1643, 1733, 1754.
37. The first Newspaper in America was the *Boston News Letter, New York Times, Philadelphia Ledger, Poor Richard's Almanac, Providence Journal*.
38. The houses of the first colonists were generally built of *brick, cement, dirt, marble, logs*.
39. The last of the thirteen colonies founded was *Conn., Del., Ga., Md., Mass., N. C., N. Y., Pa., S. C., R. I., Va.*
40. In emigrating the colonists generally went *east, north, south, west*.
41. The last of the Dutch governors was *Hudson, Minuit, Stuyvesant, Winthrop, Yardley*.
42. The Germans settled mostly in *Md., N. J., N. Y., Pa., R. I., S. C., Va.*

43. The City of Brotherly Love was founded by *William Berkley, George Calvert, John Endicott, William Penn, John Smith, Miles Standish.*
44. The most important of the Four Inter-Colonial Wars to the colonists was *Queen Anne's, King George's, French and Indian, King William's.*
45. By the middle of the 18th century the form of government most desired by the colonists was *aristocracy, autocracy, democracy, monarchy, oligarchy.*
46. The Quakers in Mass. were persecuted by the *Baptists, Methodists, Moravians, Puritans, Dutch Reformed.*
47. The Colony of Ga. was once invaded by the *Dutch, French, Irish, Spanish, Swedes.*
48. The colony of Me. was once under the proprietorship of *John Davenport, Sir Ferdinando Gorges, Anne Hutchinson, William Kieft, John Davenport.*
49. The "Holy Experiment" was tried out by *William Bradford, William Brewster, Jacob Leisler, Peter Minuit, William Penn.*
50. When the colonists first landed in America they found the natives to be *Caucasians, Chinese, Indians, Malays, Negroes.*

SEC. 2.—*Schools Taking Test I.* In the spring of 1918 the writer sent out or administered personally approximately 1,500 copies of Test I to schools in Massachusetts, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Minnesota. Those administered by the writer were in schools in or near Philadelphia. The returns from a distance came from school officials who were interested in educational progress and there is every reason to believe that the test was administered according to directions. In all 1,250 papers were returned, corrected and tabulated by the writer. The others were lost in one way or another.

In the spring of 1919 the writer administered personally approximately 1,500 more of the same test in schools in and near Pittsburgh. This district is distinctly cosmopolitan, and has the further advantage for experimentation of variation resulting from the complex school organization of former years. Allegheny County is so populous and wealthy that many independent school districts are supported. The "State of Allegheny" has been aptly applied to this region. Even in the city itself, Pittsburgh, independent characteristics of instruction may yet be noted among those holding over from the ward system, although that form of organization was years ago supplanted by a modern unified system. The results from

this region within a few miles distance show as wide a variability as those gained from different states.

When the data from this comparatively limited area had been scored, tabulated and weighted, they were found to be as valuable as the data coming the previous year from the seven states extending as far east as Massachusetts and as far west as Minnesota. This new material was all the more striking since it was procured in different years.

Table I shows how closely the results for the two different years and from such widely separated school systems correspond. Using the Pearson cos. method of correlation in which  $r = \cos \frac{ad + bc}{be}$  the coefficient is found to be 1.00. If Sheppard's method of unlike signs be applied in which  $r = \cos \frac{U}{L + U}$ , the coefficient is found to be 1.00. Of course these formulæ are for approximate results, but they are convenient for giving a quantitative statement about the data in this table which by inspection shows remarkable agreement. By Spearman's "Foot Rule,"  $r = .98$ .

The data producing these results came from pupils who were ready for high school in the following June.

The values in Table I for 1918 are based upon the errors made by 1,250 pupils; the values for 1919 are based upon the errors made by 1,250 additional pupils, 2,500 in all.

Table II is a modification of Table I and brings out other interesting details explained in the table headings.

Fig. I shows in a graphic form the distribution of errors made by the 2,500 pupils. The close approximation to the Normal Curve of Error may be noted.

Taking the test as a whole the addition of the data in the second year made but few striking changes. In many cases the ranking is identical. The algebraic sum of the shifting differences is zero. The author had additional data from pupils to add to that gathered in 1919, but when the results turned out so little different from those of the previous year it was not considered necessary to use them.

SEC. 3.—*Schools Taking Test II and III.* Although the re-

TABLE I  
COMPARISON OF THE SIGMA VALUES FOUND FOR EACH OF THE  
EXERCISES OF TEST I

No. of Exercise	Value 1918	Value 1919	No. of Exercise	Value 1918	Value 1919
1	.53	.43	26	3.00	3.03
2	1.94	2.05	27	2.84	2.77
3	1.96	2.16	28	1.90	1.95
4	2.43	2.44	29	2.25	2.37
5	2.31	2.39	30	3.15	2.74
6	2.40	2.37	31	2.36	2.31
7	1.98	2.12	32	2.42	2.38
8	3.39	3.32	33	3.43	3.36
9	1.75	1.85	34	2.76	2.80
10	2.48	2.46	35	2.28	2.34
11	2.39	2.39	36	1.85	2.05
12	1.50	1.46	37	3.49	3.32
13	3.49	3.35	38	.75	.73
14	1.57	1.64	39	2.62	2.66
15	3.03	3.01	40	2.05	1.94
16	2.65	2.61	41	2.13	2.04
17	2.86	2.77	42	2.72	2.51
18	2.25	2.29	43	1.46	1.41
19	1.99	2.04	44	1.59	1.58
20	2.55	2.55	45	1.50	1.40
21	2.03	2.26	46	2.23	2.28
22	1.27	1.35	47	....	2.42
23	1.73	1.86	48	....	3.26
24	1.43	1.41	49	....	2.24
25	1.19	1.24	50	....	.51

sults from Test I were satisfactory the exercises were too uniform in value to construct a series of standardized tests or scales. By reference to Table II it can be seen that the nearest approach to the zero value is .43 sigma; and the nearest approach to the other extreme of the scale, 5.0, is 3.36 sigma.

In the fall of 1919 Test II was devised with the purpose of finding, if possible, well recognized material whose value would be more varied than that yet discovered. Some exercises were then devised which were thought to be very easy for pupils to work out, and others which were supposedly very difficult. The study of Bagley and Rugg was the source of the material as before, and it was sanctioned by teachers as being fair for the pupils. The same form was used as previously except that the number of suggested answers was kept uniform. Eleven different schools were chosen for

TABLE II  
COMPARISON OF VALUES FOR THE EXERCISES OF TEST I  
FOR TWO YEARS

Number of Each Exercise	Sigma Value in 1919	Sigma Value in 1918	Rank in 1919	Rank in 1918	Difference in Ranking for the two years	
					D+	D-
1	.43	.52	1	1	0	0
38	.73	.75	2	2	0	0
25	1.24	1.19	3	3	0	0
22	1.35	1.27	4	4	0	0
45	1.40	1.50	5	7	0	2
24	1.41	1.43	6	5	1	0
43	1.41	1.46	7	6	1	0
12	1.46	1.50	8	8	0	0
44	1.58	1.59	9	10	0	1
14	1.64	1.57	10	9	1	0
9	1.85	1.75	11	11	0	0
23	1.86	1.78	12	12	0	0
40	1.94	2.05	13	20	0	7
28	1.95	1.90	14	14	0	0
41	2.04	2.13	15	21	0	6
19	2.04	1.99	16	18	0	2
2	2.05	1.94	17	15	2	0
36	2.05	1.85	18	13	5	0
7	2.12	1.98	19	17	2	0
3	2.16	1.96	20	16	4	0
21	2.26	2.03	21	19	2	0
46	2.28	2.23	22	22	0	0
18	2.29	2.25	23	24	0	1
31	2.31	2.36	24	27	0	3
35	2.34	2.28	25	25	0	0
29	2.37	2.25	26	23	3	0
6	2.37	2.40	27	29	0	2
5	2.38	2.31	28	26	2	0
32	2.38	2.42	29	30	0	1
11	2.39	2.39	30	28	2	0
4	2.44	2.43	31	31	0	0
10	2.46	2.48	32	32	0	0
42	2.51	2.72	33	36	0	3
20	2.55	2.55	34	33	1	0
16	2.61	2.65	35	35	0	0
39	2.66	2.62	36	34	2	0
30	2.74	3.15	37	42	0	5
17	2.77	2.86	38	39	0	1
27	2.77	2.84	39	38	1	0
34	2.80	2.76	40	37	3	0
15	3.01	3.03	41	41	0	0
26	3.03	3.00	42	40	2	0
8	3.32	3.39	43	43	0	0
37	3.32	3.49	44	46	0	2
13	3.35	3.49	45	45	0	0
33	3.36	3.43	46	44	2	0
Total					36	36

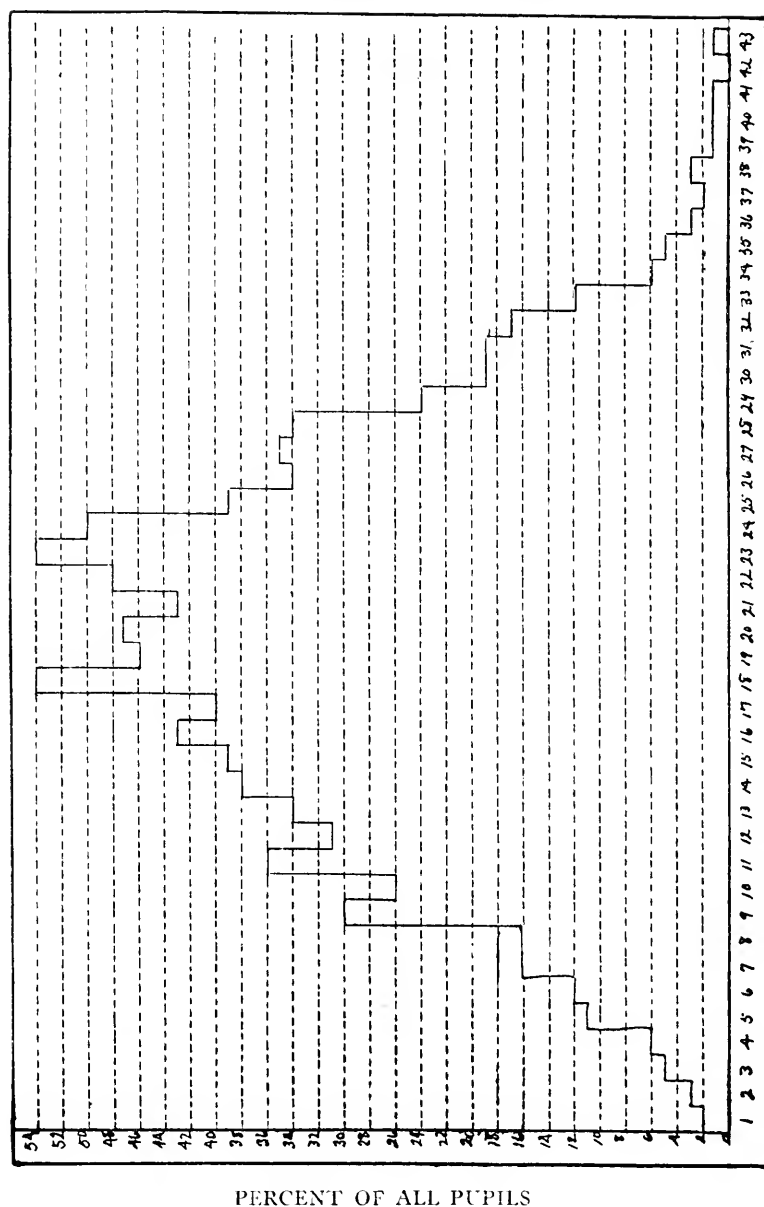


Fig. 1. Number of Errors made by the 2500 Pupils taking Test I

the experiment which were in every way comparable with the schools in which Test I was given. The same directions were followed as before, and the work was all done by the author. Especial care was taken in administering, scoring and tabulating the results in order to make the outcome as accurate as possible. In spite of all the possible precautions the net results of this work revealed no exercises to be of lower value or decidedly higher value than were found in Test I.

It was therefore necessary to devise another test which was designated as Test III. The same methods of working were used as before except that the pupils were permitted to grade their own papers first, and all the material needed for weighting the exercises was gathered in the school room according to a plan to be given in detail in Chapter III. The results were more satisfactory. All the exercises in Tests II and III were then carefully evaluated and considered as preliminary values to forming two tentative scales. In all 1,102 pupils had been tested in 18 different schools. At this point are given copies of Tests II and III. The same directions were followed in each test.

### Test II

#### EXERCISES IN COLONIAL HISTORY

Draw a line around the *one* italicized word which is needed to turn each exercise into a historical fact.

1. The "Mayflower Compact" was drawn up by the *Baptists*, 1  
*Huguenots, Methodists, Pilgrims, Quakers.*
2. When the earliest colonists arrived in America they were wel- 2  
comed by the *Caucasians, Chinese, Indians, Malays, Negroes.*
3. George Washington was fitted for leadership in the Revolutionary 3  
War through his experiences in the Colonial War of *Queen*  
*Anne, King George, French and Indian, King William.*
4. By the opening of the Revolutionary War the number of colonies 4  
had increased to *twelve, thirteen, fourteen, fifteen, sixteen.*
5. The first attempt of the English to colonize in America was in what 5  
was later called the colony of *Conn., Del., Mass., Penna., Va.*
6. The territorial claims of the English in America were established 6  
by the treaty of *Aix-la-Chapelle, American, Paris, Ryswick,*  
*Utrecht.*
7. The period of colonization took place largely in the period begin- 7  
ning with *1400, 1500, 1600, 1700, 1800.*

8. The political control of the Dutch in America came to an end with the surrender of Governor Stuyvesant to the *English, French, Germans, Spaniards, Swedes*. 8
9. "Braddock's Defeat" occurred in the *first, second, third, fourth*, Colonial War. 9
10. The first written constitution springing from the people and creating a government was in *Conn., Del., Mass., Penna., Va.*
11. The French army built menacing forts in Western *Conn., Mass., Md., N. J., Penna.* 11
12. The leadership of John Winthrop was noted in the founding of *Baltimore, Boston, Charleston, Philadelphia, Providence*. 12
13. The most outspoken friend of the colonists in the English Parliament was *Dinwiddie, Montcalm, Pitt, Townshend, Wolfe*. 13
14. Lord Delaware lived in England nearly all the time he was governor of *Delaware, Massachusetts, New Jersey, Rhode Island, Virginia*. 11
15. The "Pilgrim Fathers" came from *England, France, Germany, Spain, Sweden*. 15

## EXERCISES IN UNITED STATES HISTORY

## Test III

## COLONIAL PERIOD

Draw a line around the *one* italicized word which is needed to turn each exercise into a historical fact.

1. The Pilgrim Fathers came from *England, France, Germany, Spain, Sweden*. 1
2. The last colony was founded in the *15th, 16th, 17th, 18th, 19th*, century. 2
3. The New Sweden of 1638 later became known as the colony of *Conn., Del., N. H., Pa., R. I.* 3
4. Among the many hardships of the time were the unexpected attacks by *Arabian, Chinese, Cossack, Indian, Negro* warriors. 4
5. More lasting and prominent political events took place in *Baltimore, Boston, Charleston, New York, Philadelphia* than in any other city. 5
6. The colonists were assisted in the French and Indian Wars by the *Iroquois, Mohegan, Narragansett, Pequot, Wampanoag* Indian tribe. 6
7. The right of woman suffrage was granted for a time in *Conn., Del., Mass., N. J., Va.* 7
8. Local business affairs in the New England settlements were gen- 8



erally managed by the *governor, king, mayor, minister, town-meeting.*

9. The welfare of the New York colony was much helped by the very 9  
early settlement of the Huguenots at *Albany, New Burg,  
New Rochelle, Saratoga, West Point.*
10. The strict Puritan church of early New England gradually gave way 10  
to what was later known as *Baptist, Congregationalist, Lutheran,  
Methodist, Spiritualist Church.*
11. The light at night in these early homes came from *candles, elec- 11  
tricity, gas, kerosene, torches.*
12. The Quakers founded *Ga., Mass., N. H., Pa., S. C.* 12
13. By the time the Mayflower arrived at Plymouth Rock, it had crossed 13  
the *Antarctic, Arctic, Atlantic, Indian, Pacific ocean.*
14. The most common means of travel by the earliest settlers was by 14  
*aeroplane, railroad, steamboat, trolley lines, walking.*
15. The United Colonies of New England was formed in *1619, 1630, 15  
1643, 1683, 1763.*
16. All the colonies were founded by men from *Africa, Asia, Aus- 16  
tralia, Europe, South America.*
17. The "Thirteen Original Colonies" were once all under the political 17  
control of *England, France, Holland, Spain, Sweden.*
18. Pocahontas was an *English, French, German, Indian, Spanish girl.* 18
19. Lord Delaware lived in England nearly all the time he was gov- 19  
ernor of *Del., Mass., N. J., R. I., Va.*
20. The first written constitution springing from the people and creating 20  
a government was in *Conn., Del., Mass., N. J., Va.*

When you have finished turn your paper over.

Number of errors.....

It will be noted that there is some overlapping in the two tests. This was done to see if certain exercises would retain their rank when conditions were kept as uniform as possible; and further to see if a few hundred pupils are all that is necessary to ascertain the relative difficulty, or the ease of a given point in history. That the exercise, "The first written constitution springing from the people and creating a government in America was in *Conn., Del., Mass., Penna., Va.,*" had a value of 3.55 in the first 11 schools and a value of 3.49 in the succeeding 7 schools was not due to mere chance. The experience with this exercise and the others used in both tests showed that if the material is carefully chosen, administered scien-

tifically, and a proportional sampling carefully guarded, only a few hundred pupils are necessary to tell the relative difficulty of a list of historical points.

Attention is called to the dual numbering of the exercises in Tests II and III and Lists X and Y. The numbering at the right was used by the writer in checking over the corrections made by pupils. The point to this device is that the writer found it more convenient to indicate his marks on the right hand side of the page where the right hand never obstructs the view in a quick survey of the page. This last suggestion may seem like a trivial point but the observance of such details facilitates the work when the scoring runs up into the thousands of exercises to correct.

SEC. 4.—*Scoring the Exercises.* The scoring was done by the writer or by competent assistants under his direction. In all there were about 125,000 responses of pupils to check over respecting Test I alone; 6,000 for Test II; 14,000 for Test III; and 46,000 for Lists X and Y. Counting the control checks that were used respecting high school and normal school students more than 192,000 pupils' responses were taken into consideration in the scoring to produce the results desired. In the case of Tests I and II each exercise was looked over to see if it had been worked correctly or not. If an error had been made a straight line was drawn obliquely downward at the left of the number of the exercise in the case of Test I; but to the right in the case of Test II since the numbers of the exercises were written on both sides. This kind of mark was used because it is quickly drawn and easily discerned, being away from the horizontal of the printed lines.

Only errors were counted. They were less in number taken on the whole; only errors were considered in weighting; and the errors are the points of consideration in diagnosis. The number of errors on each paper was totaled and the sum placed at the lower right hand corner of the front page.

As the work of scoring so many thousands of responses soon borders on the line of drudgery, several methods were used to expedite the work. Stencils were used such as are now used in scoring some of the current Intelligence Tests; a certain rhythm was maintained by the use of a phonograph; but the most effectual plan

devised was to commit to the point of mechanical memory the correct answers as they should appear in order in running down the examination paper. Any departure from the regular order or correct responses was thus readily and immediately detected. In Lists X and Y where pupils corrected their own papers it was necessary only to take samplings at random and unusual scores to see if the corrections needed to be checked over. In Chapter III is given the detailed directions which were used when pupils were permitted to mark and check over their own work.

SEC. 5.—*Tabulating the Results.* After the papers had been scored it was necessary to tabulate the results so they could be analyzed and interpreted. In this part of the statistical procedure the writer aimed to secure accuracy, speed, simplicity and the possibility of checks at as many points as possible. The plan adopted for this study is illustrated in Fig. 2. The tabulations are the actual results taken from the errors made by 22 pupils to whom Test II was given.

PUPILS' PAPERS BY NUMBER

	1	2	3	3	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1																						0
2																						0
3													/									1
4																				/	/	2
5				/							/	/										2
6			/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	9
7						/			/		/	/	/	/	/	/	/	/	/	/	/	8
8						/	/				/	/	/	/	/	/	/	/	/	/	/	7
9	/		/	/		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	7
10	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	7
11												/	/	/	/	/	/	/	/	/	/	7
12							/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	3
13					/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	6
14	/	/	/			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	20
15											/	/	/	/	/	/	/	/	/	/	/	0
	2	2	3	3	3	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	9
																						129 Total

FIGURE 2  
SHOWING FORM IN WHICH DATA WERE TABULATED  
FROM TEST I

These tabulations of school by school were made on cross section paper 16"x21" ruled 5 spaces to the inch. Every fifth line was drawn heavier to assist the eye in keeping track of certain points in counting. Along the top of each sheet were written the numbers corresponding to the numbering of the papers handed in by the pupils examined. There was thus in each instance as many columns needed as there were pupils or papers. Every fifth number was written more heavily or in red ink.

Along the side at the left were written the numbers of the exercises corresponding to each exercise of the test. In tabulating the scores for Test I, 50 horizontal lines were needed for each school. Every fifth number was written more heavily or in red ink for convenience in counting. There were needed 60 of such large sheets. They were held together by strong steel clips, and protected by heavy flexible card board.

Errors only were tabulated. If a pupil made but one error on the test, only one mark was placed in the column assigned to his paper. The other spaces of that column were left blank. An error was indicated by a straight line drawn diagonally at the intersection of the proper vertical and horizontal spaces. The sum of the number of marks for each column gives the total number of errors or score for each pupil. The sum of the number of marks for each row gives the total number of errors made by all the pupils of the school on each exercise. The grand totals of the sums at the right of the page and along the bottom are equivalent. These totals serve as a check in counting.

Another convenience in checking was found worth while when the papers were arranged in order of the scores made, beginning at the smallest number of errors. The papers were then numbered consecutively to correspond with the numbers at the top of the large tabulating sheet. In addition to this advantage the median score for any school was found almost at a glance.

As a check on the accuracy in tabulating, the number of errors made by each pupil was counted as fast as each paper was disposed of. This total equals the total number of errors recorded at the top of the paper, or the pupil's score on his own paper. Since these two numbers check all along, the sum of the errors made by all

pupils equals the sum of the errors on each of the exercises, the former number serving as the standard.

The tabulation thus is quite rapid and easy so long as the work is close to the numbering at the left of the sheet. As the record of each pupil moves to the right and farther away, the eye strain is increased. The writer overcame this by spacing and numbering the plain side of an ordinary school ruler in duplicate of the column of numbers representing the exercises at the left of the large tabulating sheet. The numbers were written in red ink for prominence and durability. This ruler was moved along column by column right at the space provided for each pupil's record. If certain guiding lines for the ends of the ruler are observed even the tendency to errors is slight and the eye strain is reduced to a minimum. Only after the discovery of these useful devices in tabulating was it possible to dispose of the routine work rapidly and easily.



## CHAPTER III

### TENTATIVE SCALES IN THE FORM OF LIST X AND LIST Y

From the results of Test II and Test III two tentative scales were made out, and administered as List X and List Y. Exercise number 1 in List Y was devised and purposely added with the idea of trying once more to find an exercise so easy that all pupils could work it successfully. This exercise reads, "The most commonly spoken language of early New England was *Dutch, English, French, Scandinavian, Spanish.*" Exercise number 14 in List X was added with the purpose of seeing if it would turn out to be a difficult one. This exercise reads, "The gap in location, age, and ideals between the Northern and Southern colonies was bridged over by the founding of *Del., Md., N. J., N. Y., Pa.*" The rest of the content of these two tests is given in full in this chapter. The ranking in difficulty was the chief consideration in making the selection for these lists. In case of alternatives, frequency of use in later periods, or social usage determined the choice.

The method of administering did not differ in principle from the method used in the preceding experiments but it was written out more in detail for the benefit of the supervisors who assisted the writer in gathering data. The chief purpose in writing up these detailed directions was to try out the plan devised in the preliminary work whereby pupils could assist in marking and correcting their own papers. A copy of these directions for administering the exercises to pupils and for scoring the papers is here given:

#### EXERCISES IN UNITED STATES HISTORY

Directions to Teachers for administering Lists X and Y:

1. Place upon the blackboard:
  - (a) Columbus discovered *Africa, America, Asia, Australia.*
  - (b) The Revolutionary War began in the year *1763, 1765, 1775, 1776.*
  - (c) The London Company was formed in *England, France, Holland, Italy.*
2. Say to Pupils: "Here are some exercises in United States History. They are turned into historical facts when a line is drawn around the correct one of the several suggested answers." Draw a line

around *America, 1775*, and *England* in the examples, and read the exercises as correct historical facts.

3. "I shall pass around exercises similar to these which are worked in the same way.
4. "Try to work out each exercise whether you are sure of the correct answer or not.
5. "Take as much time as you need, but no more.
6. "When all have finished working I shall read the correct answers and you may correct your own papers.
7. "Mark only the numbers of the exercises incorrectly worked. Use an 'X.'"
8. After pupils have made the necessary corrections, direct them to exchange papers and keep them.
9. Read over the correct answers again and have the pupils check over the papers to detect any errors or omissions in the first correction.
10. Place on the blackboard the numbers corresponding to the exercises.
11. Say to Pupils: "Look on the papers you now have and see if a mistake was made in working out the first exercise, that is No. 1. If so, please raise your hand and hold it up until I take the count."
12. Count the number of hands raised and place the sum opposite No. 1.
13. Repeat the process until the number of errors made on each exercise has been correctly determined.
14. Copy the results for each set of exercises and send them and the papers to Sturgiss B. Davis, School of Education, University of Pittsburgh.

### List X

## EXERCISES IN UNITED STATES HISTORY

### COLONIAL PERIOD

Draw a line around the correct suggested answer in each Exercise.

1. When the earliest colonists arrived in America they found the land  
already inhabited by the *Chinese, Cossacks, Indians, Malays,*  
*White men.* 1
2. The "Mayflower Compact" was drawn up by the *Baptists,*  
*Huguenots, Methodists, Pilgrims, Quakers.* 2
3. The "Thirteen Original Colonies" were at one time all under the  
political control of *England, France, Holland, Spain, Sweden.* 3
4. The most common means of travel used by the earliest settlers was  
by *acroplane, railroad, steamboat, trolley-line, walking.* 4
5. One of the turning points in our Colonial History was marked by  
the capture of *Acadia, Deerfield, Louisburg, Port Royal, Quebec*  
in the French and Indian War. 5



6. The political control of the Dutch in America came to an end when Governor Stuyvesant surrendered to the *English, French, Germans, Spaniards, Swedes.* 6
7. The Quakers founded the colony of *Ga., Mass., N. H., Pa., S. C.* 7
8. The first attempt of the English to colonize in America was in what was later called the colony of *Conn., Del., Mass., Pa., Va.* 8
9. The period of settlement for most of the colonies took place in the century beginning with *1400, 1500, 1600, 1700, 1800.* 9
10. Local business affairs in the New England settlements were generally managed by the *governor, king, mayor, minister, town-meeting.* 10
11. The territorial claims of the English in America were established by the treaty of *Lix-la-Chapelle, America, Paris, Ryswick, Utrecht.* 11
12. The strict Puritan Church of early New England gradually gave way to what has since become known as the *Baptist, Congregationalist, Lutheran, Methodist, Spiritualist* church. 12
13. The first written constitution in the colonies springing from the people and creating a government was the colony of *Conn., Del., Mass., N. J., Va.* 13
14. The gap in location, age, and ideals between the Northern and Southern Colonies was bridged over by the founding of *Del., Md., N. J., N. Y., Pa.* 14

Put number of errors here.....

*List Y*

EXERCISES IN UNITED STATES HISTORY  
COLONIAL PERIOD

Draw a line around the correct suggested answer in each Exercise.

1. The most commonly spoken language of early New England was *Dutch, English, French, Scandinavian, Spanish.* 1
2. Among the many hardships of the time were the unexpected attacks by *Arabian, Chinese, Cossack, Indian, Negro warriors.* 2
3. Every one of the colonies was founded by men from *Africa, Asia, Australia, Europe, South America.* 3
4. By the time the "Mayflower" had arrived at Plymouth Rock it had crossed the *Antarctic, Arctic, Atlantic, Indian, Pacific* ocean. 4
5. Under the "Treaty Elm" William Penn made a lasting peace with the *Canadians, Huguenots, Indians, Negroes, Puritans.* 5
6. The light at night in the early homes came from *candles, electricity, gas, kerosene, phosphorus.* 6
7. The Colonists and English soldiers were assisted in the French and Indian War by the loyalty of the *Iroquois, Mohegan, Narragansett, Pequot, Wampanoag* Indian tribe. 7

8. To stop the movement of the Colonists westward the French soldiers 8  
built a line of forts in western *Conn., Mass., Md., N. J., Pa.*
9. More lasting and prominent political events took place in *Baltimore,* 9  
*Boston, Charleston, New York, Philadelphia* than in any other  
one city.
10. The colony of South Carolina was noted for the very early settlement 10  
of the *Baptists, Catholics, Huguenots, Lutherans, Methodists,* in  
the founding of Charleston.
11. The last colony was founded in the *15th, 16th, 17th, 18th,* 11  
*19th* century.
12. "Braddock's Defeat" occurred in the *First, Second, Third, Fourth* 12  
French and Indian, or Inter-Colonial War.
13. The "United Colonies of New England" was formed in *1634, 1643,* 13  
*1683, 1733, 1774.*
14. Lord Delaware lived in England nearly all the time he was governor 14  
of *Conn., Del., N. J., R. I., Va.*

Your teacher will read the correct answers. Mark any Exercises missed on the left side with an "X." Count the number of Exercises missed and place the sum here.

Number missed.....

These lists were submitted to 1,564 pupils early in 1920. Many of the pupils were in schools of the city of Pittsburgh where a double promotion system is in practice. The pupils tested were in most cases nearly ready for the mid-year promotion to high school. Some of the schools were in boroughs near the city where there was also the mid-year promotion system. Sixteen schools in widely separated sections were chosen. All the work was done by the writer or by competent supervisors.

The consistency of the results from these 1,564 pupils when compared with the previous data on the same exercises convinced the writer that the many long hours he spent in scoring and tabulating the results of Tests I and II were expended unnecessarily. If all the steps are well planned in advance and if the teachers help to guard against irregularities among pupils, and count the show of hands for errors, all the necessary data for weighting questions may be had right in the classroom. In one instance 260 pupils were gathered in an assembly room. They were seated in groups in **alternate seats**. Each teacher was detailed to give an account of

her own group. With the assistance of a blackboard and carefully laid plans, all these pupils were examined; the papers corrected and checked; and the number of errors on each exercise tabulated in little more than a double classroom period. Tables III and IV show how the data were tabulated as saved from school to school. In these tables are designated the names of the different schools and the number of pupils tested in each one; the number of each exercise, and the total number of errors made by the 1,564 pupils examined on each of the exercises.

All that was necessary in addition to this data was to find what per cent. of all the pupils examined missed each of the exercises in Lists X and Y. As the data from Lists X and Y could be supplemented by the data from the preliminary work on Tests II and III, this was done. The number of pupils tested was thus brought up to either 2,064 or 2,266 for each exercise, except in the case of number 13 in List Y where the grand total was 2,766. The values given in Tables V and VI are based upon these numbers. Tables VII and VIII are added to show how closely the ranking of the exercises conforms to the values found from the preliminary work on Tests II and III, and that the remaining exercises in Test II and III might be used at will. The correlations are almost perfect by Spearman's formula.

Before concluding this chapter it should be stated that the author's prior estimate of the ease or difficulty of an exercise was only the roughest kind of an approximation. What was supposed to be a very easy exercise ranked fifth in difficulty. Other similar instances appeared throughout the study.

TABLE III—SHOWING HOW DATA WAS RECORDED BY SCHOOLS

LIST X	SCHOOLS																Total No. of Errors on Each Exercise
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
NUMBER OF EACH EXERCISE																	
1	1	10	0	2	9	1	4	0	1	3	1	1	3	6	2	0	44
2	0	3	1	0	4	3	5	0	0	11	0	4	5	12	0	1	49
3	1	0	6	2	6	4	1	0	0	12	0	2	6	8	0	0	48
4	1	2	7	7	11	4	4	2	1	16	0	2	3	15	5	2	82
5	4	1	15	19	20	7	9	7	5	61	3	18	5	61	6	16	257
6	5	3	17	12	33	14	7	8	3	32	3	6	28	47	5	7	230
7	10	30	37	33	50	23	14	2	1	59	9	3	32	81	6	10	400
8	29	15	51	54	62	33	11	1	7	67	17	15	36	155	9	12	574
9	15	18	38	60	83	18	7	8	6	65	15	13	40	109	11	14	520
10	31	36	52	76	80	16	34	14	16	79	27	29	48	129	22	61	750
11	32	37	72	83	88	47	29	16	8	121	23	38	47	185	14	17	857
12	22	61	76	93	106	33	34	17	18	194	29	36	65	119	31	52	986
13	37	76	61	72	85	51	23	12	11	157	26	38	38	194	16	43	940
14	36	88	69	73	77	47	26	9	13	136	21	31	57	202	26	45	956
Total No. of Pupils in Each School.....	209	104	88	103	119	62	41	26	20	258	44	46	80	260	34	70	1564

TABLE IV—SHOWING HOW DATA WAS RECORDED BY SCHOOLS

LIST Y	SCHOOLS																Total No. of Errors on Each Exercise
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	
1	2	0	20	10	16	5	2	1	0	18	0	2	15	46	1	2	140
2	0	4	5	6	1	0	2	1	1	6	0	1	4	6	1	0	38
3	1	1	10	8	17	3	1	0	2	2	0	1	5	19	1	1	72
4	0	1	9	12	9	5	6	3	0	5	0	0	9	25	1	3	88
5	2	44	10	1	11	4	6	0	1	11	0	1	3	24	1	4	123
6	8	14	20	20	33	3	4	0	1	19	4	1	5	37	2	6	177
7	8	17	22	29	42	18	14	9	1	65	5	14	25	45	1	10	325
8	8	34	42	26	54	31	23	7	7	83	13	14	38	106	5	21	512
9	23	44	43	27	41	31	8	8	12	72	18	24	34	91	6	14	496
10	22	43	60	72	91	42	31	16	14	121	27	23	36	175	20	21	754
11	22	55	58	48	86	43	34	9	13	123	28	27	53	125	21	50	795
12	35	81	66	70	79	48	32	15	13	153	26	32	54	182	13	51	950
13	35	83	77	80	99	49	37	16	12	188	33	39	71	209	28	51	1107
14	43	56	74	93	92	59	33	16	14	204	40	45	70	230	29	57	1155
Total No. of Pupils in Each School Tested	209	124	88	103	119	62	41	26	20	258	44	46	80	260	34	70	1564

TABLE V  
TOTAL NUMBER OF ERRORS MADE ON EACH EXERCISE IN LIST X

Exercise Number	Number of Errors	Same Exercise in Test II	Same Exercise in Test III	Grand Total	Percentage Value	Sigma Value
1	44	6	...	50	2.42	.63
2	49	13	...	62	3.00	.70
3	48	...	36	84	3.70	.79
4	82	...	64	146	6.44	1.03
5	257	...	...	257	16.42	1.55
6	230	84	...	314	15.20	1.50
7	400	...	183	583	25.71	1.87
8	574	173	...	747	36.15	2.16
9	520	200	...	720	34.85	2.13
10	750	...	428	1178	51.95	2.53
11	857	...	285	1142	50.36	2.50
12	986	...	571	1557	68.66	2.97
13	940	347	493	1780	64.44	2.85
14	956	...	...	956	61.09	2.77
Total No. of Pupils taking each test						
	1564	500	702			

TABLE VI  
TOTAL NUMBER OF ERRORS MADE ON EACH EXERCISE IN LIST Y

Exercise Number	Number of Errors	Same Exercises in Test II	Same Exercises in Test III	Grand Total	Percentage Value	Sigma Value
1	140	...	...	140	8.95	1.19
2	38	...	27	65	2.87	.69
3	72	...	51	123	5.42	.95
4	88	...	60	148	6.53	1.04
5	123	...	...	123	7.86	1.13
6	177	...	193	370	16.32	1.54
7	325	...	223	548	24.16	1.82
8	512	167	...	679	32.86	2.07
9	496	...	384	880	38.81	2.23
10	754	...	...	754	48.18	2.47
11	795	...	504	1299	57.29	2.67
12	950	314	...	1260	60.98	2.76
13	1107	...	487	1594	70.30	3.02
14	1155	363	550	2068	74.86	3.15
Total No. of Pupils taking each test						
	1564	500	702			

TABLE VII  
RANK OF EXERCISES IN LIST X IN SECOND TRIAL

Rank and No. of the Exercise	Percent of all Pupils Missing	Sigma Value	Rank in Second Trial	Abstract of Contents of Each Exercise
1	2.81	.68	I	Indians here before the white men came
2	3.13	.72	III	"Mayflower Compact" for the Pilgrim Fathers
3	3.07	.71	II	England controlled 13 original colonies
4	5.24	.93	IV	Walking most common means of travel
5	16.42	1.55	V	Capture of Quebec turning point
6	14.70	1.48	VI	Stuyvesant surrendered to the English
7	25.56	1.86	VII	Quakers founded Pennsylvania
8	36.68	2.18	IX	Va. colony first English settlement
9	33.23	2.08	VIII	Period of settlement from 1600 to 1700 mostly
10	47.93	2.46	X	Townmeeting managed business affairs
11	54.76	2.60	XI	Treaty of Paris established English claims
12	63.00	2.82	XIV	Puritan church represented by Congregationalist
13	60.07	2.74	XII	First written constitution in Conn.
14	61.09	2.77	XIII	Pa. bridged gap between North and South

Correlation by Spearman's "Footrule" is .98.

TABLE VIII  
RANK OF EXERCISES IN LIST Y IN SECOND TRIAL

Rank and No. of the Exercise	Percent of all pupils Missing	Sigma Value	Rank in Second Trial	Abstract of Contents of Each Exercise
1	8.95	1.19	V	English Language most common
2	2.43	.63	I	Indian attacks among the hardships
3	4.60	.88	II	Men from Europe founded the colonies
4	5.62	.97	III	The Mayflower crossed the Atlantic Ocean
5	7.86	1.13	IV	The Treaty Elm marked peace with Indians
6	11.31	1.32	VI	Candles furnished the light at night
7	20.77	1.71	VII	Iroquois assisted the English soldiers
8	32.72	2.07	IX	French built a line of forts in Pa.
9	31.69	2.04	VIII	Philadelphia a political center
10	48.18	2.47	X	Huguenots settled Charleston
11	50.80	2.50	XI	Last colony founded in 18th century
12	60.70	2.76	XII	Braddocks Defeat in French and Indian War
13	70.74	3.03	XIII	"United Colonies of New England." in 1643
14	73.80	3.12	XIV	Lord Delaware, Governor of Va.

Correlation by Spearman's "Footrule" is .97.





## CHAPTER IV

### WEIGHTING THE RESULTS OF THE DATA ON EACH EXERCISE

SEC. 1.—*Plan of Procedure.* After tabulating the total number of errors made by all the pupils taking each exercise these numbers were transformed into percentages. The first question answered was: what per cent. of all the pupils examined failed in exercise number one, two, three, four, and so on for the whole list?

The plan adopted for doing this was as follows: a blank book of cross section paper was procured which had more than twice as many pages as the number of exercises to be weighted. The right hand pages of the book were numbered consecutively in large figures in red ink. As many pages were numbered as there were exercises to be weighted. In a column at the left on these pages were listed the numbers of the large tabulation sheets in which the data from each school were tabulated. After each of these numbers was listed the total number of errors found for each exercise on the large tabulation sheet. The sum of these numbers taken sheet by sheet gave the total number of errors made on any given exercise.

On the left hand pages of the book were made the necessary calculations to determine the weight of each exercise. These calculations consisted in finding the percentages and then transmuting them into sigma values. When the data on the 1,250 pupils tested in 1918 on Test I were utilized, advantage was taken of the convenient quotient given when 100 is divided by 1250. This is .08 and was used as a constant multiplier in finding the percentage of errors made on each exercise. The work was further facilitated by the use of Crelle's Calculating Tables. An allustration is offered to save further description. On a certain exercise, X pupils failed out of the 1,250 examined. Required, to find the percentage of failure in this instance.

$$\frac{X}{1250} \times \frac{100}{1} = \frac{100}{1250} \times \frac{X}{1} = 8X\%$$

When the equation is stated in this form it is evident that the fraction 100/1250 is a constant in each calculation, and the variable

is always the number of errors made on each exercise. Hence the calculation in each instance is reduced to multiplying .08 through means of a calculating table by the total number of errors made on each exercise.

The next step was the transmutation of these percentage values into sigma values. This was done by means of the tables prepared for such a purpose by Rugg. Both Tables V and VI in this manual were considered but Table V was chosen because it is built upon the usual five divisions of the base line of the Normal Curve of Frequency. It is also accurate enough for the purposes of this study.

No attempt is made here to explain the Normal Curve of Frequency or its use in finding the absolute ease or difficulty of questions. Its use is now widely recognized and accurate descriptions and explanations are available to students of educational problems.

Many investigators of educational problems have used the P. E. values in weighting questions. Sigma values were used in this study because these new tables of Rugg are more convenient to read and the values may be found directly regardless of the median point of reference. The sigma unit value was also used because it is a natural function of the Normal Curve and is widely used by students in Biology, Sociology, Agriculture, and Actuarial Work.

For the sake of comparison, however, the P. E. values of Test I were calculated and compared with the sigma values. In order to get these P. E. values it was necessary to assume a point of reference, since no exercise was found which all pupils could answer. This point of reference was—4.3 P. E. from the mean ordinate. It was derived from the first exercise which 98.68% of the pupils worked out correctly. Table XLVII in Buckingham's Study of "Spelling Ability" was used in calculating the P. E. values. Table IX of this study shows the comparisons in full.

SEC. 2.—*Tests for the Reliability of the Data.* Several means of checking on the reliability of data were considered before the values here presented were considered valid. These means are all discussed in books on Statistical Method and need only to be mentioned here.

The curve of errors shown in Fig. I was plotted and compared with the normal curve drawn from the same median ordinate.

TABLE IX  
COMPARISON OF P. E. AND SIGMA VALUES

No. of Exercise	Percent Correct	Difference between 50% and Score	P. E. Values	Dist. in P. E. above Zero Point	P. E. Value	Sigma Value
1	98.68	-48.68	-3.3	1.00	10	4
2	68.00	-18.00	-.693	3.607	36	20
3	64.08	-14.08	-.535	3.765	37	22
4	63.08	-13.08	-.496	4.104	41	24
5	55.20	-5.20	-.194	4.406	44	24
6	55.84	-5.84	-.216	4.084	40	24
7	65.4	-15.4	-.588	3.712	37	21
8	20.04	+29.96	+1.243	5.543	55	33
9	74.96	-24.96	-.996	3.004	30	19
10	52.20	-2.20	-.082	4.218	42	25
11	55.04	-5.04	-.187	4.113	41	24
12	85.64	-35.64	-1.576	2.724	27	15
13	19.04	+30.96	+1.296	5.596	55+	34
14	81.20	-31.20	-1.313	3.287	29	16
15	29.84	+20.16	+ .782	5.082	50	30
16	44.88	+5.12	+ .187	4.487	45	26
17	38.72	+11.28	+ .426	4.726	47	28
18	59.08	-9.08	-.341	3.959	39	23
19	68.44	-18.44	-.710	3.590	35	20
20	47.36	+2.64	+ .097	4.397	44	26
21	60.20	-10.2	-.383	3.019	39	23
22	87.64	-37.64	-1.713	2.587	25+	14
23	74.64	-18.64	-.719	3.581	35+	19
24	86.84	-36.84	-1.656	2.644	26	14
25	90.16	-40.16	-1.980	2.320	23	12
26	29.12	+20.68	+ .807	5.107	51	30
27	38.84	+11.16	+ .422	4.722	47	28-
28	71.52	-21.52	-.842	3.458	34	19+
29	55.76	-5.96	-.213	4.087	41-	24-
30	39.80	+10.20	+ .383	4.683	47	27
31	58.28	-8.28	-.311	3.989	40-	23
32	55.40	-5.4	-.201	4.099	40+	24
33	18.92	+31.08	+1.307	5.607	56	34
34	37.56	+12.44	+ .468	4.768	48	28
35	56.92	-6.92	-.258	4.042	40	23
36	68.16	-18.16	-.698	3.602	36	20
37	20.08	+29.92	+1.243	5.543	55	33
38	96.80	-46.80	-2.746	1.554	15	7
39	42.92	+7.08	+ .261	4.561	45	26+
40	72.00	-22.00	-.864	3.436	34	19
41	68.52	-18.52	-.714	3.586	36-	20
42	49.28	+ .72	+ .026	4.326	43	25
43	86.88	-36.88	-1.663	2.637	26	14
44	82.84	-32.84	-1.403	2.897	28+	16-
45	87.12	-37.12	-1.677	2.623	26	14
46	59.32	-9.32	-.349	3.951	39	23
47	53.68	-3.68	-.172	4.128	41	24
48	21.76	+28.24	+1.155	5.455	54	32+
49	60.80	-10.80	-.407	3.895	39	22
50	98.30	-48.15	-3.077	1.223	12	5

The same curve of errors was smoothed successively until no appreciable change was evident.

In both these instances the theoretical curve did not differ decidedly from the real curve obtained from the responses of children.

The check on the reliability of the data which was most used was the consistency shown in the percentage of errors pupils made on each exercise from school to school. In the case of each test there came a point where the addition of more data from pupils made little or no change. When that point was reached, no further data were taken.

Another test of the reliability of the data, though an *indirect* one, was the constant tendency revealed in the results from each school. This tendency was the wide variability of the achievements of individual pupils. Since the pupils who took the test were all the most advanced ones in the elementary school such variability was not expected, unless it was due to inherent mental differences which the history tests brought out. These statements are supported by Table X which shows the wide range of errors for each of the 58 schools taking Test I.

If the variability was due to the inherent capacity of pupils to master the formal requirement of the school in United States History, the scores in these history exercises should indicate correlation with the scores of a recognized intelligence test. Table XI was prepared from the scores of 203 pupils who had taken the Pressey Intelligence Test and Test III of the history exercises. The scores are not altogether comparable since the intelligence test is really a composite of several tests, each intended to test a different mental ability. The history test on the other hand invokes probably largely the factors of selective judgment and recall. However, it was the best data obtainable at the time on this point.

An examination of the correlation table made up of these two classes of scores shows that they produced much the same general effect. In both tests the variability was marked, but in general the brighter pupils made the better history scores. The median score in the intelligence test was 140.6. Only twelve pupils ranking below this median score in intelligence made a high score in the history test. Both tests also showed large individual differences in

TABLE X  
RANGE OF ERRORS MADE BY INDIVIDUAL PUPILS  
IN THE SCHOOLS TAKING TEST I

Schools	Range	Schools	Range
I	1-27	XXX	13-33
II	4-35	XXXI	5-27
III	8-34	XXXII	10-36
IV	11-33	XXXIII	2-28
V	17-31	XXXIV	7-28
VI	9-41	XXXV	4-33
VII	6-32	XXXVI	1-30
VIII	6-37	XXXVII	8-40
IX	5-32	XXXVIII	11-31
X	6-31	XXXIX	11-31
XI	5-30	XL	5-29
XII	7-26	XLI	7-29
XIII	5-25	XLII	9-37
XIV	4-29	XLIII	9-36
XV	5-27	XLIV	7-43
XVI	7-25	XLV	2-32
XVII	11-33	XLVI	8-32
XVIII	13-36	XLVII	7-35
XIX	5-29	XLVIII	2-40
XX	7-27	XLIX	2-30
XXI	6-23	L	6-31
XXII	7-31	LI	9-36
XXIII	8-32	LII	4-38
XXIV	9-36	LIII	12-36
XXV	17-40	LIV	1-18
XXVI	7-23	LV	7-35
XXVII	3-34	LVI	12-33
XXVIII	6-38	LVII	3-36
XXIX	11-38	LVIII	16-37

the pupils. These facts suggest that the material of the history test contained exercises, some of which were inherently easy and some inherently difficult. This last statement is consistent with the constant tendency revealed in the percentage of errors pupils made on certain exercises when the attainments of pupils were compared by schools.

Having found the marked differences in the scores of pupils of the same school it was pertinent to find out whether the same characteristic would be found among the different schools themselves. The measure used for this test of reliability was the coefficient of dispersion based upon the semi-inter-quartile range and the median score found for each school taking Test I. Table XII shows these

## POINTS IN PRESSY INTELLIGENCE TEST

POINTS CORRECT IN HISTORY TEST III	POINTS IN PRESSY INTELLIGENCE TEST																		
	87-91	92-96	97-101	102-106	107-111	112-116	117-121	122-126	127-131	132-136	137-141	142-146	147-151	152-156	157-161	162-166	167-171	172-176	177-181
8																			2
9																			13
10																			26
11																			51
12																			34
13																			37
14																			12
15																			10
16																			4
17																			3
18																			1
	1	0	5	2	7	3	10	15	23	19	23	25	16	27	16	15	1	2	1

Table XI. Correlation table showing relationship between scores correct in Pressy Intelligence Test and Test III of the Exercises in Colonial History

coefficients of dispersion for each of the 58 schools taking the test. The difference noted in the range is inconsequential when the facts are known about these two schools. The school in which the lowest coefficient was found is one whose scope is limited and the supervisor is a typical drill master. The school in which the highest coefficient appeared is located in an industrial center in the Northwest. The pupils of this school were expecting to take a commercial course the following year in the high school. What is striking about this table however is the range of the middle-fifty per cent. of the cases. It is less than 10 points; Q is approximately 4.8; and the C. D. is but .22. These findings are consistent with the statement given out by the New Committee of Eight on courses in history. This statement is to the effect that the present content of American History courses for the Seventh and Eighth Grades is the best standardized of all courses in history. The coefficient .22 conforms remarkably well with the index of variability established by Courtis for his test in the four fundamentals of arithmetic. His

standard was derived in approximately the same way and is given as .20. No question has ever been raised either as to the content or value of the data upon which Courtis derived his standard.

In concluding this topic of variability the writer feels justified in saying that the content of the history exercises is well recognized material; and that the form of the exercises always reveals individual differences in the same class or school. When large groups are compared, however, the performance of pupils is approximately uniform.

*Table XII*

COEFFICIENTS OF DISPERSION DERIVED FROM THE SCORES OF  
THE 58 SCHOOLS TAKING TEST I

Index	Frequency	
9	1	
11	2	
12	4	
13	2	
14	2	Range = 9—40
15	4	
16	2	Median = 21.7
17	4	
18	1	Q. = 4.8
19	1	
20	3	C. D. = .22
21	4	
22	4	
23	6	
24	1	
25	4	
26	2	
28	1	
30	4	
31	1	
33	1	
34	2	
37	1	
40	1	
<hr/>		
Total	58	

SEC. 3.—*The Reading Difficulty of the Exercises.* In evaluating the reliability of pupils' responses the reading difficulty must be taken into consideration. Can the assumption be maintained that pupils may know history but because of the difficulty of the form of the test itself they do not know what is wanted of them?

Some investigators have dismissed this question by saying that if pupils cannot read their school texts by the time they have reached the eighth grade, they are helpless so far as formal schooling goes. If the words used in the test are familiar to pupils, and if the construction of sentences are not unusual, the claim of these investigators is logical.

In order to get direct evidence on the reading difficulty of Test I the writer submitted the exercises one by one to individual pupils. He went to the principal's office in two different schools and selected children from the eighth grade at random for personal interviews. In each instance the test was put before the pupil with the request that he read the exercise and simply state just what was to be done after reading it. No answers were required, and no comment made. The aim of the examiner was to get the pupil to think out loud.

A case record was kept for each pupil by noting any peculiarity or difficulty in his responses. In no instance was there a single pupil who did not know exactly just what was wanted in each exercise. The words *delusion*, *influential*, *indentured*, and *professional* were not fully comprehended by some pupils when they were questioned after the examination, but in each case these same pupils gathered from the context of the exercise exactly what was wanted. These pupils had an impressionistic knowledge of these difficult words and recognized them sufficiently to use them in sentences. In the case of the exercise referring to the "witchcraft delusion occurring among the Puritans," some pupils passed over the word *delusion* and associated witchcraft with Puritans at once. Instances were found where the pupil could work out this exercise but could not use the word *delusion* readily in a sentence. The examination in this case was conducted somewhat after the manner of Terman in the vocabulary test used in his Stanford Revision of the Binet-Simon Test for Intelligence of School Children.

Another instance in line with the above came out in respect to the word, *indentured*. One pupil remarked when questioned



about its use in the exercise, "You do not have to know what it means exactly; servants and slaves gives you the idea of what is wanted." This boy knew the correct answer to the exercise also. These private interviews with pupils threw much direct light on the reading difficulty of these particular exercises and indicated that the mental process involved was associative memory to a marked extent.

In order to get further data on the reading difficulty of this type of testing the scores of 241 eighth grade pupils who had taken the Monroe Reading Test, and Test III of the History exercises, were compared in a correlation table. Table XIII reveals at a glance that the degree of correspondence is low. As a matter of fact it is so low that it is negligible, being .04 by the Pearson formula.

Test I could have been improved by simplifying the wording. However, it was thought wise to leave the exercises in the original form for the purpose of this study. All the words in the test are in use in standard text books and teachers have not criticized their inclusion.

SCORES IN HISTORY TEST III

	8	9	10	11	12	13	14	15	16	17	18	f
11	2		3					1	1			8
14	1	1	2	6	3	3	3	1	1			21
17			5	8	7	3	4	2	1	1		32
20	1	4	3	7	5	9	5	2	2		1	39
23	1	2	2	5	2	6	6	1				25
26	1	3	4	3	5	3	3			1		23
29		2	4	7	1	8	3	3	2	1		40
32	1	1	4	3	2	4	1					16
35		1	2		2	1						7
38		1	1			3		1				6
41		2	2	2		4	1					11
44				1								1
47	1	3				4	2	2				12
	5	19	28	49	36	46	33	14	5	3	3	241

TABLE XIII

Showing Correlation Between Scores in Monroe Reading Test and Test III in History

Lists X and Y represent an improvement in the wording of exercises. Through practice one can readily become skilled in framing exercises that meet all the standards set up in Chapter I. In general it may be offered that so long as the vocabulary of the exercises correspond to that of standard text books, this reading difficulty of words, or sentence structure, does not seem to be at fault nearly so much as the lack of purpose in reading. This was shown very definitely in a reading test prepared by the writer in which paragraphs were taken verbatim from a school history which the pupils had used.

SEC. 4.—*The Element of Success by Chance. Formula.* In addition to the reading difficulty it was suggested that some pupils were successful through the operation of a chance selection of the correct one of the several suggested answers. The tabulation of the scores on the large tabulation sheets where all the scores from a single school could be seen at a glance, gave no evidence of the operation of the law of chance. The difficult exercises were worked out only by the pupils who made good scores consistently throughout the test as a whole. When pupils were questioned individually regarding the reasons for the answers chosen, they always gave a plausible explanation even though their answers were incorrect. For the purposes of diagnosis it was desired that pupils select what they considered to be the correct answer, and they were encouraged to try each one of the exercises. In no instance was there found evidence of wild, haphazard guessing at the correct answer among pupils who took the testing material for it was all more or less familiar to them. They thought they knew whether they did or not.

In the event that it seemed advisable at any time to make corrections for the element of chance entering into the scores of pupils, a correction formula was developed. The formula was suggested by the one offered by McCall which he used in eliminating the effects of chance selection in his experiment with the "True and False" type of examination. This is given in an article entitled "A New Kind of School Examination." The formula offered in this instance was: "Pupil's Score = (number correct) — (number wrong)." Starting with this formula it was developed so that any number of chance selections could be considered. Simultaneously

Buckingham did the same thing and expressed his formula as follows:

" $S = c - \frac{w}{n-1}$  where  $S$  is the score after account has been taken of the elements of chance;  $c$  is the number of correct answers;  $w$  is the number of wrong answers; and  $n$  is the number of alternatives offered for each question."

This formula is especially convenient for use in correcting scores where the number of correct results are always wanted. The following formula is more convenient where the test is long and the number of errors only are considered as was done in the case of this study:

$$\text{True Score} = n - \frac{c}{c-1} (w)$$

where,

$n$  = the number of exercises in the test

$c$  = the number of chances in each exercise of guessing the right answer

$w$  = the number of wrong answers

To illustrate: Suppose a test contained 15 exercises. There were 5 suggested answers in each exercise. A certain pupil made 12 errors on his paper. The answers given by the pupil were inconsistent with his training. It is required to find his probable true score.

Substituting the numbers 15, 5, and 12 in the formula,

$$\text{True score} = 15 - \frac{5}{4} (12) = 0$$

Instead of the pupil being credited with a score of 3 correct, a truer estimate of his real knowledge on this test is probably zero.

To show how nicely this formula works out when the true status of conditions is known, the following additional illustration and analysis will make the point clearer.

Suppose a test contains 20 exercises. In each exercise there are 5 chances of selecting the correct answer. I know the answers in 5 different exercises for certain. I am ignorant entirely of the rest but take a chance at hitting the right ones. When my paper is returned to me I find that the examiner has credited me with 8 answers correct.

Now a score of 8 is absurd, for I knew only five answers. The

extra three credits came to me by mere chance. A score of five is all I deserve; for,

20 = the number of exercises in the test.

5 = the number of answers really known.

15 = the number of answers not known at all.

3 = the number of answers possible to get correct by law of chance.

$5 + 3 =$  total number of answers correct by knowledge and by chance.

$20 - 8 = 12$ , the number marked wrong by the examiner.

True Score  $= 20 - \frac{5}{4}(12) = 5$ , which expresses exactly the score I deserve.

## CHAPTER V

### CLASSIFICATION OF ALL THE STANDARDIZED EXERCISES INTO SCALES C AND D AND TESTS E AND F

Since the data gathered from Tests I, II, III, and Lists X and Y stood the proposed tests of reliability, all the 85 exercises were arranged in order of their value in terms of the sigma unit. This arrangement is given in Table XIV.

A study of this table reveals the possibility of arranging the different exercises into scales and tests based upon their difficulty. Two scales and two tests are here proposed. Other arrangements are possible, but the ones given illustrate the theory of procedure. The organization of the material for Test E will be considered first.

In constructing a standardized test the aim should be to include those points whose difficulty is as nearly equal as possible. By reference to Table XIV it may be seen that that largest number of exercises which approximate the same value lie between the sigma values of 2.03 and 2.55. On each side of these points in the distribution, the values do not run so closely together in such a large number of cases. These 32 exercises may be set aside tentatively as the possibility of a standardized test.

On further examination of the remaining exercises the possibility of a scale seems evident. The word scale is here used in the sense of a series of exercises whose values differ equally from one another by some adopted unit. By moving the decimal point in the sigma values one place to the right, and then forcing the number to the next unit if the first decimal figure is greater than .5 and conversely neglecting the decimal figure if equal to or less than .5, a series of 16 values may be found which differ from one another by two points. Such a series of exercises is offered in the form of Scale C. The actual sigma values and approximations are given in the score sheet for Scale C.

On further examination of the distribution of the sigma values, the possibility of another scale is seen if a unit of .25 is taken as the basis. Such a scale is offered in the series of exercises in the form of Scale D. The values for the proposed scale are given in the

score sheet for Scale D. The guide to forming this scale was the succession of steps running from .50 up to 3.25. The 12 exercises presented approximate these steps quite closely.

*Table XIV*

THE ABSOLUTE VALUES OF ALL THE EXERCISES ARRANGED  
IN ORDER

VALUE

ABSTRACT OF CONTENT

- .43 The Mayflower was a ship.
- .54 The White men found the Indians here.
- .64 The Pilgrims came from England.
- .69 Sudden attacks from the Indians were among the hardships.
- .70 The Mayflower Compact was drawn up by the Pilgrims.
- .73 First houses were generally built of logs.
- .79 Engiand once controlled all the colonies.
- .95 Men from Europe founded the colonies.
- 1.03 Walking was the most common means of travel.
- 1.04 The Mayflower crossed the Atlantic ocean.
- 1.13 The Treaty Elm marked a lasting peace with the Indians in Pa.
- 1.19 English was the most commonly spoken language.
- 1.20 The colonies increased to 13 by the time of the Revolutionary War.
- 1.22 Pocahontas was an Indian girl.
- 1.24 Pocahontas is said to have saved the life of John Smith.
- 1.37 New York was founded by the Dutch.
- 1.40 By the latter part of the 18th century democracy was wanted.
- 1.41 The City of Brotherly Love was founded by William Penn.
- 1.41 The "Great Treaty" was between the Indians and William Penn.
- 1.46 The Charter Oak was a tree.
- 1.50 The Dutch colony surrendered to the English.
- 1.54 Candles furnished the light in the early homes.
- 1.55 The capture of Quebec was a turning point in American history.
- 1.58 The French and Indian War was the most important to the colonists.
- 1.64 The English were the most numerous of all the nationalities.
- 1.82 The Iroquois Indians assisted the English against the French.
- 1.85 Corn was the principal native food crop.
- 1.86 Tobacco was the main export crop from Va.
- 1.87 The Quakers founded Pa.
- 1.87 In the French and Indian War Washington gained experience for the Revolution.
- 1.94 Emigration was generally westward.
- 1.95 The Plymouth Rock is in Mass.
- 2.03 Stuyvesant was the last of the series of Dutch governors.
- 2.04 Massasoit kindly received the Pilgrims.
- 2.04 The Act of Toleration was decreed by the Catholics in Md.

- 2.05 Miles Standish led in fighting the Indians.
- 2.05 Jamestown was founded in 1607.
- 2.07 The French built a line of forts in western Pa.
- 2.12 The Witchcraft Delusion occurred among the Puritans.
- 2.13 The period of settlement was from 1600 on approximately.
- 2.16 Roger Williams founded R. I.
- 2.16 The first attempt of the English to colonize was in Va.
- 2.23 Philadelphia was the seat of permanent political events.
- 2.26 Slavery was introduced in 1619.
- 2.28 The Quakers were persecuted by the Puritans.
- 2.29 The Holy Experiment was tried out by William Penn.
- 2.29 Geo. Oglethorpe founded Ga. to help poor debtors of England.
- 2.31 Indentured servants held in Va.
- 2.34 First settlement of Catholics in Colony of Md.
- 2.37 First Pilgrims landed in 1620.
- 2.37 First college founded was Harvard.
- 2.38 Sir Edmund Andros was the Royal Governor of New England.
- 2.38 William Pitt the most outspoken friend in the English Parliament.
- 2.38 Thomas Hooker led in founding Conn.
- 2.39 Bacon's Rebellion was against Lord Berkeley.
- 2.42 The Spanish once invaded Ga.
- 2.44 The Patroons were Dutch landowners.
- 2.45 New Sweden later became the colony of Delaware.
- 2.46 Mason and Dixon line surveyed between Pa. and Md.
- 2.47 Huguenots founded Charleston.
- 2.50 Treaty of Paris established the English claims in America.
- 2.51 The Germans settled mostly in Pa.
- 2.53 The townmeeting settled local business affairs in New England.
- 2.55 First settlement of the Swedes was in Delaware.
- 2.61 Preachers the most influential professional class in New England.
- 2.66 Ga. was the last colony founded.
- 2.67 The last colony was founded in the 18th century.
- 2.74 William Claibourne led a rebellion against Lord Baltimore.
- 2.76 Braddock's Defeat occurred in the Fourth Inter-Colonial War.
- 2.77 The founding of Pa. bridged the gap between the North and South.
- 2.80 William Bradford was once leader of the Pilgrims.
- 2.85 Conn. had the first written constitution springing from the people.
- 2.92 John Winthrop was the leader in founding Boston.
- 2.97 The Congregationalist Church grew out of the Puritan Church.
- 3.01 The government of early Pa. was proprietary.
- 3.02 The United Colonies of New England was formed in 1643.
- 3.03 Rhode Island had the charter form of government.
- 3.05 The right of woman's suffrage was granted for a time in New Jersey.
- 3.15 Lord Delaware resided in England while governor of Va.
- 3.32 Boston News Letter the first newspaper in America.

- 3.32 John Berkeley and Geo. Carteret once owned N. J.  
 3.35 John Locke drew up the Grand Model.  
 3.36 1619 marked the time of the first Representative Assembly in A.  
 3.39 Gorges once proprietor of Maine.  
 3.45 The Huguenots' settlement at New Rochelle was quite prosperous.

Since Scale D is comprised of only 12 exercises its construction may be used to show how scales may be graphically illustrated. Figure 3 was drawn for this purpose and the explanation of it is as follows: Let the line A B represent the base line of the normal probability curve broken off at 2.5 on each side of the mean ordinate. This length is equivalent to a base line of 5 divisions with O at one end and 5 at the other. If each of the sigma units be divided into 100 equal parts, the location of any sigma value is easily determined when the graph is drawn on cross section paper ruled 10 lines to the inch.

Since the values of Scale D extend approximately from .50 to 3.25 with a unit difference between any points of .25, the location of the 12 exercises is readily apparent. In the absence of an exercise of zero and .25 difficulty the first exercise must be placed at .5 and the last at 3.25. Exercises 3, 7, and 11 fall at  $1\sigma$ ,  $2\sigma$  and  $3\sigma$  respectively. The intervening values fall at the successive quarter points as illustrated in figure 3. All the values of the 85 exercises given in table XIV may be located on a base line divided and subdivided as the line A B. In the case of Test E, described more fully below, all the 26 values fall within less than half the distance between two sigma points.

In the formation of these two scales, values are needed extending throughout nearly the whole range of the distribution of sigma values. Six out of the 32 exercises set aside tentatively to form a test were used in the formation of Scales C and D. The 26 remaining exercises out of the 32 set aside were used to make up what is

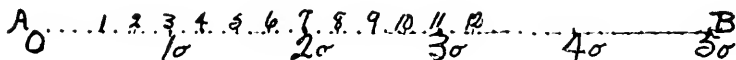


FIG. 3 SHOWING THE LOCATION OF EACH OF THE 12 EXERCISES OF SCALE D.



here presented as Test E. The values for each of the exercises in this test are given in its accompanying score sheet. By reference to it one sees the greatest possible difference between any two exercises is less than .50 sigma. When the values of the exercises are grouped into a series with a class interval of .05, the average sigma value of the series is found to be 2.29; the standard deviation from this central tendency is but .15, and the coefficient of dispersion based upon the average and standard deviation is only .068. These statistical methods were applied to this series of exercises to test the homogeneity of the list.

After Scales C and D and Test E had been formed, there remained 31 exercises whose values did not conform either to the definition of a *true test* or a *true scale*. These exercises are just as valuable for testing purposes though not so convenient to use. Their value for the diagnosis of a pupil's difficulties is even better, however, than the other proposed measures since the range of the weightings is greater. These 31 exercises were then arranged in order of value with a score sheet and is here given as Test F.

Test F is an illustration of a popular conception of the word *test*; that is, a series of questions or exercises whose value is simply known. In grading a pupil's work credit should be given on each point earned in proportion to its absolute value. Test E is an illustration of a *true test* wherein the value of all the questions or exercises is the same or approximately so. A pupil's score on such a test equals the sum of the points earned multiplied by the value common to each question or exercise.

In a *true scale* the questions or exercises are arranged in order of the values, the easiest usually of zero difficulty being placed at the head of the list. As a pupil progresses in learning he is able to work farther down the list. His score is represented by the value of the last exercise worked successfully. Theoretically the effort required to progress from one point to the next is the same since the interval between any two points is a constant value.

The words test and scale have been much used interchangeably. The distinction here given is offered to prevent a misconception of the two scales and two tests presented in this chapter.

## SCALE C

1. The Mayflower was a *chapel, hall, hotel, plant, queen, ship*.
2. The Pilgrim Fathers came from *England, France, Germany, Spain, Sweden*.
3. The "Thirteen Original Colonies" were at one time all under the political control of *England, France, Holland, Spain, Sweden*.
4. The most common means of travel used by the earliest settlers was by *aeroplane, railroad, steamboat, trolley-lines, walking*.
5. Pocahontas is said to have saved the life of *Sir William Berkeley, Jonathan Edwards, William Penn, John Rolfe, John Smith*.
6. The City of Brotherly Love was founded by *William Berkeley, George Calvert, John Endicott, William Penn, John Smith, Miles Standish*.
7. Of the nationalities represented in all the colonies the most numerous were the *Dutch, English, French, Germans, Irish, Scotch, Swedes*.
8. The principal native food crop was *barley, corn, oats, potatoes, rice, rye, wheat*.
9. The Toleration Act in Md. was decreed by the *Catholics, Episcopalians, Puritans, Quakers*.
10. More lasting and prominent political events took place in *Baltimore, Boston, Charleston, New York, Philadelphia* than in any other one city.
11. The Patroons were Dutch *fishermen, fur traders, landowners, miners, preachers, teachers*.
12. The most influential professional class in New England were the *editors, lawyers, physicians, preachers, teachers, writers*.
13. The first written constitution in the colonies springing from the people and creating a government was the colony of *Conn., Del., Mass., N. J., Va.*
14. The Charter form of government was enjoyed by the people of *Del., Ga., Md., Pa., R. I., Va.*
15. Lord Delaware lived in England nearly all the time he was governor of *Conn., Del., N. J., R. I., Va.*
16. The First Representative Assembly held in America was in *1697, 1619, 1620, 1643, 1754*.

## SCORE SHEET FOR SCALE C

No. of Each Exercise	The Correct Answer	Approximate Value	Sigma Value	Suggested Practical Value
1	Ship	4	.43	1
2	England	6	.64	1
3	England	8	.79	1
4	Walking	10	1.03	1
5	John Smith	12	1.24	1
6	William Penn	14	1.41	1
7	English	16	1.64	2
8	Corn	18	1.85	2
9	Catholics	20	2.04	2
10	Philadelphia	22	2.23	2
11	Land Owners	24	2.44	2
12	Preachers	26	2.61	3
13	Connecticut	28	2.85	3
14	Rhode Island	30	3.03	3
15	Virginia	32	3.15	3
16	1619	34	3.36	3

## SCALE D

1. When the colonists first landed in America they found the natives to be *Chinese, Indians, Malays, Negroes, White Men*.
2. The houses of the first colonists were generally built of *brick, cement, dirt, logs, marble*.
3. Every one of the colonies was founded by men from *Africa, Asia, Australia, Europe, South America*.
4. Pocahontas was an *English, French, German, Indian, Spanish* girl.
5. One of the turning points in our Colonial History was marked by the capture of *Acadia, Deerfield, Louisburg, Port Royal, Quebec* in the French and Indian Wars.
6. The Colonists and English soldiers were assisted in the French and Indian Wars by the loyalty of the *Iroquois, Mohegan, Narragansett, Pequot, Wampanoag* Indian tribe.
7. The last of the Dutch governors was *Hudson, Minuit, Stuyvesant, Winthrop, Yardley*.
8. The Quakers in Mass. were persecuted by the *Baptists, Dutch Reformed, Methodists, Moravians, Puritans*.
9. The first settlement by the Swedes was in *Conn., Del., Ga., Md., Mass., N. C., N. H., N. Y.*
10. William Bradford was once Leader of the *Baptists, Catholics, Pilgrims, Quakers*.
11. The "United Colonies of New England" was formed in *1634, 1643, 1683, 1733, 1774*.
12. The first newspaper in America was the *Boston News Letter, New York Times, Philadelphia Ledger, Poor Richard's Almanac, Providence Journal*.

## SCORE SHEET FOR SCALE D

No. of Each Exercise	The Correct Answer	Approximate Value	Sigma Value	Suggested Practical Value
1	Indians	.50	.54	1
2	Logs	.75	.73	1
3	Europe	1.00	.95	1
4	Indian	1.25	1.22	1
5	Quebec	1.50	1.55	2
6	Iroquois	1.75	1.82	2
7	Stuyvesant	2.00	2.03	2
8	Puritans	2.25	2.28	2
9	Delaware	2.50	2.55	3
10	Pilgrims	2.75	2.80	3
11	1643	3.00	3.02	3
12	Boston News Letter	3.25	3.32	3

## TEST E

1. The Pilgrims were kindly received by Chief *Canonicus, Massasoit, Philip, Powhatan.*
2. Miles Standish led in fighting the *Dutch, Indians, Puritans, Swedes.*
3. Jamestown was founded in *1607, 1619, 1620, 1643, 1733, 1754.*
4. To stop the movement of the Colonists westward the French soldiers built a line of forts in western *Conn., Md., Mass., Pa., N. J.*
5. The Witchcraft delusion occurred among the *Baptists, Catholics, Dutch, Indians, Puritans.*
6. The period of settlement for most of the colonies took place in the century beginning with *1400, 1500, 1600, 1700, 1800.*
7. Roger Williams founded the colony of *Ga., Md., Mass., N. C., N. J., Pa., R. I., S. C., Va.*
8. The first attempt of the English to colonize in America was in what was later called the colony of *Conn., Del., Mass., Pa., Va.*
9. Slavery was first introduced in *1607, 1619, 1629, 1643, 1683, 1775, 1787.*
10. The "Holy Experiment" was tried out by *William Bradford, William Brewster, Jacob Leisler, Peter Minuit, William Penn.*
11. To help the poor debtors of England James Oglethorpe founded the colony of *Conn., Del., Ga., Md., N. J., S. C., Va.*
12. Indentured servants and slaves were held mostly in *Del., Ga., Pa., S. C., Va.*
13. The first settlement of the Catholics was in *Conn., Del., Md., Mass., N. C., N. H., N. J., R. I.*
14. The first Pilgrims landed in *1607, 1619, 1620, 1643, 1683, 1776, 1789.*
15. The first college founded was *Brown, Harvard, Pennsylvania, Princeton, William and Mary, Yale.*
16. The most outspoken friend of the colonists in the English Parliament was *Dinwiddie, Montcalm, Pitt, Townshend, Wolfe.*
17. As Royal Governor of New England Sir Edmond Andros represented *the Common People, the Continental Congress, the English Crown, the Proprietors.*
18. Thomas Hooker led emigrants from Mass. to found *Conn., Del., Ga., Md., N. J., N. Y.*
19. Nathaniel Bacon led a Rebellion against the tyranny of Governor *Andros, Argall, Berkeley, Dale, Minuit, Winthrop, Yearley.*
20. The colony of Ga. was once invaded by the *Dutch, French, Irish, Spanish, Swedes.*
21. The New Sweden of 1638 later became known as the colony of *Conn., Del., N. H., Pa., R. I.*
22. The Mason and Dixon Line was established between Pa. and *Del., Md., N. J., N. Y., Ohio.*
23. The colony of South Carolina was noted for the very early settlement of the *Baptists, Catholics, Huguenots, Lutherans, Methodists* in the founding of Charleston.

24. The territorial claims of the English in America were established by the treaty of *Aix-la-Chapelle, America, Paris, Ryswick, Utrecht.*
25. The Germans settled mostly in *Md., N. J., N. Y., Pa., R. I., S. C., Va.*
26. Local business affairs in the New England settlements were generally managed by the *governor, king, mayor, minister, town-meeting.*

## SCORE SHEET FOR TEST E

No. of Each Exercise	The Correct Answer	Approximate Value	Sigma Value
1	Massasoit	2	2.04
2	Indians	2	2.05
3	1607	2	2.05
4	Pennsylvania	2	2.07
5	Puritans	2	2.12
6	1600	2	2.13
7	Rhode Island	2	2.16
8	Virginia	2	2.16
9	1619	2	2.26
10	William Penn	2	2.29
11	Georgia	2	2.29
12	Virginia	2	2.31
13	Maryland	2	2.34
14	1620	2	2.37
15	Harvard	2	2.37
16	Pitt	2	2.38
17	English Crown	2	2.38
18	Connecticut	2	2.38
19	Berkeley	2	2.39
20	Spanish	2	2.42
21	Delaware	2	2.45
22	Maryland	2	2.46
23	Huguenots	2	2.47
24	Paris	2	2.50
25	Pennsylvania	2	2.51
26	Town-meeting	2	2.53

## TEST F

1. Among the many hardships of the times were the unexpected attacks by *Arabian, Chinese, Cossack, Indian, Negro* warriors.
2. The "Mayflower Compact" was drawn up by the *Baptists, Huguenots, Methodists, Pilgrims, Quakers*.
3. By the time the "Mayflower" had arrived at Plymouth Rock it had crossed the *Antarctic, Arctic, Atlantic, Indian, Pacific* ocean.
4. Under the "Treaty Elm" William Penn made a lasting peace with the *Canadians, Huguenots, Indians, Negroes, Puritans*.
5. The most commonly spoken language of early New England was *Dutch, English, French, Scandinavian, Spanish*.
6. By the opening of the Revolutionary War the number of colonies had increased to *twelve, thirteen, fourteen, fifteen, sixteen*.
7. New York was founded by the *Dutch, English, French, Spanish, Swedes*.
8. By the latter part of the 18th century the form of government most desired by the colonists was *aristocracy, autocracy, democracy, monarchy, oligarchy*.
9. The Great Treaty was between the Indians and Governor *Berkeley, John Endicott, Cotton Mather, William Penn, John Smith, Miles Standish*.
10. The Charter Oak was a *church, meeting house, painting, school, town hall, tree*.
11. The political control of the Dutch in America came to an end when Governor Stuyvesant surrendered to the *English, French, Germans, Spaniards, Swedes*.
12. The light at night in these early homes came from *candles, electricity, gas, kerosene, phosphorus*.
13. The most important of the Four Inter-Colonial Wars to the colonists was *Queen Anne's, King George's, French and Indian, King William's*.
14. The main export crop of early Va. was *corn, cotton, indigo, rice, tobacco, wheat*.
15. The Quakers founded the colony of *Ga., Mass., N. H., Pa., S. C.*
16. George Washington was fitted for leadership in the Revolutionary War through his experiences in the Colonial War of *Queen Anne, King George, French and Indian, King William*.
17. In emigrating the colonists generally went *east, north, south, west*.
18. The "Plymouth Rock" is in *Conn., Del., Md., Mass., N. J., N. Y., Pa., R. I., S. C.*
19. The last of the thirteen colonies founded was *Conn., Del., Ga., Md., Mass., N. C., N. Y., Pa., S. C., R. I., Va.*
20. The last colony was founded in the *15th, 16th, 17th, 18th, 19th* century.
21. William Claiborne led a Rebellion against *Lord Baltimore, Lord Berkeley, Lord Brook, Lord Delaware, Lord Say*.



22. "Braddock's Defeat" occurred in the *first, second, third, fourth*, Colonial War.
23. The gap in location, age, and ideals between the Northern and Southern colonies was bridged over by the founding of *Del., Md., N. J., N. Y., Pa.*
24. The leadership of John Winthrop was noted in the founding of *Baltimore, Boston, Charleston, Philadelphia, Providence.*
25. The strict Puritan Church of early New England gradually gave way to what has since become known as the *Baptist, Congregationalist, Lutheran, Methodist, Spiritualist* church.
26. The Proprietary form of government was exercised in *Mass., N. Y., Pa., R. I., S. C., Va.*
27. The right of woman suffrage was granted for a time in *Conn., Del., Mass., N. J., Va.*
28. John Berkley and George Cartaret once owned *Conn., Del., Ga., Md., Mass., N. H., N. J.*
29. The Grand Model was drawn up by *Cecil Calvert, King Charles, John Locke, John Smith.*
30. The colony of Maine was once under the proprietorship of *John Davenport, Sir Ferdinando Gorges, Anne Hutchinson, William Kieft, Roger Williams.*
31. The welfare of the New York colony was much helped by the very early settlement of the Huguenots at *Albany, New Burg, New Rochelle, Saratoga, West Point.*

## SCORE SHEET FOR TEST F

No. of Each Exercise	The Correct Answer	Approximate Value	Sigma Value
1	Indians	1	.69
2	Pilgrims	1	.70
3	Atlantic	1	1.04
4	Indians	1	1.13
5	English	1	1.19
6	Thirteen	1	1.20
7	Dutch	1	1.37
8	Democracy	1	1.40
9	William Penn	1	1.41
10	Tree	1	1.46
11	English	1	1.50
12	Candles	1	1.54
13	French and Indian	2	1.58
14	Tobacco	2	1.86
15	Pennsylvania	2	1.87
16	French and Indian	2	1.87
17	West	2	1.94
18	Massachusetts	2	1.95
19	Georgia	3	2.66
20	18th Century	3	2.67
21	Lord Baltimore	3	2.74
22	Fourth	3	2.76
23	Pennsylvania	3	2.77
24	Boston	3	2.92
25	Congregationalist	3	2.97
26	Pennsylvania	3	3.01
27	New Jersey	3	3.05
28	New Jersey	3	3.32
29	John Locke	3	3.35
30	Gorges	3	3.39
31	New Rochelle	3	3.45

## CHAPTER VI

### USE OF THE STANDARDIZED EXERCISES FOR SUPERVISORY PURPOSES

SEC. 1.—*Reorganization of Proposed Measures into Test A and Test B, Part I and Part II.* The formation of the Scales C and D and Tests E and F illustrate the theoretical procedure in organizing standardized testing material for supervisory purposes. In the opinion of the author they are reliable and may be used by administrative officers in the form given. However, since these scales and tests were designed from the beginning to be of the greatest practical value possible, it was deemed advisable to recast all the foregoing measures into two tests. It was thought that such a revision would render the use of the standardized exercises much easier for class room teachers. One of the reasons for the wide and accepted use of the Courtis Arithmetic Tests, the Monroe Reading Test, and the Ayres Handwriting Scale is that these measures are so easily understood by those just beginning the measurement of class room products. A number of other educational measures, all theoretically correct, are not in use simply because they are too difficult to understand and use by those who should use them most. The writer therefore has sought to meet the needs of those who want to begin using standardized testing material by recasting all the foregoing Scales and Tests into the forms of Test A, and Test B, Part I and Part II.

The basis of this reclassification was to put into Test A all those exercises whose sigma value was 2 or approximately 2. This approximation includes all the exercises of Test E; exercises 13-18 of Test F; exercises 7-11 in Scale C; and exercises 5-8 in Scale D. Test B was made up into Part I and Part II. Into Part I were put all the remaining easy exercises with a value approximating 1, and into Part II all the remaining difficult exercises whose value approximates a value of 3. By so doing nothing is lost in reliability and only eight per cent in accuracy. So far as the author can learn from supervisors who have tried the tests the approximations are valid and readily used by class room teachers.

Test A, and Test B with manual of "Directions for Adminis-

tering, Scoring and Using the Results" are here reproduced for the convenience of those who wish to use the tests. Judging by the numerous inquiries for the Tests, there seems to be a real professional interest in such measures. They are not offered as finished products but as the beginning of a series of tests which should be more accurately gauged because of the experience offered in the derivation of these tests. While either test may be used separately, both should be used if the achievement of a class is to be carefully determined. The content of the 85 exercises in the two tests include all the points usually covered in the elementary school.

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Test A

Score.....

UNIVERSITY OF PITTSBURGH  
SCHOOL OF EDUCATION

EXERCISES IN UNITED STATES HISTORY  
COLONIAL PERIOD  
STURGISS B. DAVIS

Directions to Pupils—Fill in these blank lines with:

Your name..... School.....  
Grade.....; Age.....; City.....; Date.....

On the succeeding pages are historical exercises like the following:

1. Columbus discovered *Africa, America, Asia, Australia, Europe*.  
There are several suggested answers, only one of which is correct. That one of course is *America*. Draw a heavy line clear around it. This exercise is now worked out and may be read as a correct historical statement, Columbus discovered America.
2. The New World was discovered in the year 1000, 1453, 1492, 1497, 1565.  
Draw a line around the date 1492. The correct historical statement is, The New World was discovered in the year 1492.
3. The first man to sail around the world was *Balboa, Cortez, DeSoto, Drake, Magellan*.  
Draw a line around the word *Magellan*. What is the correct historical statement on which this exercise is based?
4. Try to work out each exercise whether you are sure of the answer or not. Select the one which you think is right and draw a line around it. There is *always one* correct answer in each exercise.
5. The time limit is 12 minutes. This is plenty of time if you work steadily, and do not look around.
6. Your teacher will give you all other needed directions. Listen carefully.

## TEST A

1. The Pilgrims were kindly received by Chief *Canonicus, Massasoit, Philip, Powhatan.*
2. Miles Standish led in fighting the *Dutch, Indians, Puritans, Swedes.*
3. Jamestown was founded in *1607, 1619, 1620, 1643, 1733, 1754.*
4. To stop the movement of the Colonists westward the French soldiers built a line of forts in western *Conn., Mass., Md., Pa., N. J.*
5. The Witchcraft delusion occurred among the *Baptists, Catholics, Dutch, Indians, Puritans.*
6. The period of settlement for most of the colonies took place in the century beginning with *1400, 1500, 1600, 1700, 1800.*
7. Roger Williams founded the colony of *Ga., Md., Mass., N. C., N. J., Pa., R. I., S. C., Va.*
8. The first attempt of the English to colonize in America was in what was later called the colony of *Conn., Del., Mass., Pa., Va.*
9. Slavery was first introduced in *1607, 1619, 1620, 1643, 1683, 1775, 1787.*
10. The "Holy Experiment" was tried out by *William Bradford, William Brewster, Jacob Leisler, Peter Minuit, William Penn.*
11. To help the poor debtors of England James Oglethorpe founded the colony of *Conn., Del., Ga., Md., N. J., S. C., Va.*
12. Indentured servants and slaves were held mostly in *Del., Ga., Pa., S. C., Va.*
13. The first settlement of the Catholics was in *Conn., Del., Md., Mass., N. C., N. H., N. J., R. I.*
14. The first Pilgrims landed in *1607, 1619, 1620, 1643, 1683, 1776, 1789.*
15. The first college founded was *Brown, Harvard, Pennsylvania, Princeton, William and Mary, Yale.*
16. The most outspoken friend of the colonists in the English Parliament was *Dinwiddie, Montcalm, Pitt, Wolfe, Townshend.*
17. As Royal Governor of New England Sir Edmond Andros represented the *Continental Congress, the English Crown, the Proprietors, the Common People.*
18. Thomas Hooker led emigrants from Mass. to found *Conn., Del., Ga., Md., N. J., N. Y.*
19. Nathaniel Bacon led a Rebellion against the tyranny of Governor *Argall, Andros, Berkeley, Dale, Minuit, Winthrop, Yeardley.*
20. The colony of Ga. was once invaded by the *Dutch, French, Irish, Spaniards, Swedes.*
21. The New Sweden of 1638 later became known as the colony of *Conn., Del., N. H., Pa., R. I.*
22. The Mason and Dixon line was established between Pa. and *Del., Md., N. J., N. Y., Ohio.*
23. The colony of South Carolina was noted for the very early settlement of the *Baptists, Catholics, Huguenots, Lutherans, Methodists* in the founding of Charleston.

24. The territorial claims of the English in America were established by the treaty of *Aix-la-Chapelle, America, Paris, Ryswick, Utrecht.*
25. The Germans settled mostly in *Md., N. J., N. Y., Pa., R. I., S. C., Va.*
26. Local business affairs in the New England settlements were generally managed by the *governor, king, mayor, minister, town-meeting.*
27. The most important of the Four Inter-Colonial Wars to the colonists was *Queen Anne's, King George's, French and Indian, King William's.*
28. The main export crop of early Va. was *corn, cotton, indigo, rice, tobacco, wheat.*
29. The Quakers founded the colony of *Ga., Mass., N. H., Pa., S. C.*
30. George Washington was fitted for leadership in the Revolutionary War through his experiences in the Colonial War of *Queen Anne, King George, French and Indian, King William.*
31. In emigrating the colonists generally went *east, north, south, west.*
32. The "Plymouth Rock" is in *Conn., Del., Md., Mass., N. J., N. Y., Pa., R. I., S. C.*
33. One of the turning points in our Colonial History was marked by the capture of *Arcadia, Deerfield, Louisburg, Port Royal, Quebec,* in the French and Indian Wars.
34. The Colonists and English soldiers were assisted in the French and Indian Wars by the loyalty of the *Iroquois, Mohegan, Narragansett, Pequot, Wampanoag* Indian tribe.
35. The last of the Dutch governors was *Hudson, Minuit, Stuyvesant, Winthrop, Yeardley.*
36. The Quakers in Mass. were persecuted by the *Baptists, Methodists, Moravians, Puritans, Dutch Reformed.*
37. Of the nationalities represented in all the colonies the most numerous were the *Dutch, English, French, Germans, Irish, Scotch, Swedes.*
38. The principal native food was *barley, corn, oats, potatoes, rice, rye, wheat.*
39. The Toleration Act in Md. was decreed by the *Episcopalians, Catholics, Puritans, Quakers.*
40. More lasting and prominent political events took place in *Baltimore Boston, Charleston, New York, Philadelphia* than in any other one city.
41. The Patroons were Dutch *fishermen, fur traders, landowners, miners, preachers, teachers.*

Number Right —  $\times 2 =$  — Score

Test A

Score.....

## UNIVERSITY OF PITTSBURGH

## SCHOOL OF EDUCATION

## EXERCISES IN UNITED STATES HISTORY

## COLONIAL PERIOD

STURGISS B. DAVIS

Directions to Pupils—Fill in these blank lines with:

Your name..... School.....

Grade.....; Age.....; City.....; Date.....

On the succeeding pages are historical exercises like the following:

1. Columbus discovered *Africa, America, Asia, Australia, Europe*.

There are several suggested answers, only one of which is correct. That one of course is *America*. Draw a heavy line clear around it. This exercise is now worked out and may be read as a correct historical statement, Columbus discovered America.

2. The New World was discovered in the year *1000, 1453, 1492, 1497, 1565*.

Draw a line around the date *1492*. The correct historical statement is, The New World was discovered in the year 1492.

3. The first man to sail around the world was *Balboa, Cortez, DeSoto, Drake, Magellan*.

Draw a line around the word *Magellan*. What is the correct historical statement on which this exercise is based?

4. Try to work out each exercise whether you are sure of the answer or not. Select the one which you think is right and draw a line around it. There is *always one* correct answer in each exercise.
5. The time limit is 12 minutes. This is plenty of time if you work steadily, and do not look around.
6. Your teacher will give you all other needed directions. Listen carefully.

## TEST B—PART I

1. Among the many hardships of the time were unexpected attacks by *Arabian, Indian, Chinese, Cossack, Negro* warriors.
2. The "Mayflower Compact" was drawn up by the *Baptists, Huguenots, Methodists, Pilgrims, Quakers*.
3. By the time the "Mayflower" had arrived at Plymouth Rock it had crossed the *Atlantic, Antarctic, Arctic, Indian, Pacific* ocean.
4. Under the "Treaty Elm" William Penn made a lasting peace with the *Canadians, Huguenots, Indians, Negroes, Puritans*.
5. The most commonly spoken language of early New England was *Dutch, English, French, Scandinavian, Spanish*.
6. By the opening of the Revolutionary War the number of colonies had increased to *twelve, thirteen, fourteen, fifteen, sixteen*.

7. New York was founded by the *Dutch, English, French, Spanish, Swedes*.
8. By the latter part of the 18th century the form of government most desired by the colonists was *aristocracy, autocracy, democracy, monarchy, oligarchy*.
9. The Great Treaty was between the Indians and *Governor Berkeley, John Endicott, Cotton Mather, William Penn, John Smith, Miles Standish*.
10. The Charter Oak was a *church, meeting house, painting, school, town hall, tree*.
11. The political control of the Dutch in America came to an end when Governor Stuyvesant surrendered to the *English, French, Germans, Spaniards, Swedes*.
12. The light at night in these early homes came from *candles, electricity, gas, kerosene, phosphorus*.
13. When the colonists first landed in America they found the natives to be *Chinese, Indians, Malays, Negroes, White-men*.
14. The houses of the first colonists were generally built of *bricks, cement, dirt, logs, marble*.
15. Every one of the colonies was founded by men from *Africa, Asia, Australia, Europe, South America*.
16. Pocahontas was an *English, French, German, Indian, Spanish* girl.
17. The Mayflower was a *chapel, hall, hotel, plant, queen, ship*.
18. The "Pilgrim Fathers" came from *England, France, Germany, Spain, Sweden*.
19. The "Thirteen Original Colonies" were at one time all under the political control of *England, France, Holland, Spain, Sweden*.
20. The most common means of travel by the earliest settlers was by *acroplane, railroad, steamboat, trolley lines, walking*.
21. Pocahontas is said to have saved the life of Sir *William Berkeley, Jonathon Edwards, William Penn, John Rolfe, John Smith*.
22. The City of Brotherly Love was founded by *William Berkeley, George Calvert, John Endicott, William Penn, John Smith, Miles Standish*.

Number Right —  $\times 1 =$  — Score

#### TEST B—PART II

23. The last of the thirteen colonies founded was *Conn., Del., Ga., Md., Mass., N. C., N. Y., Pa., S. C., R. I., Va.*
24. The last colony was founded in the *15th, 16th 17th, 18th, 19th* century.
25. William Claiborne led a Rebellion against *Lord Berkeley, Lord Brook, Lord Baltimore, Lord Delaware, Lord Say*.
26. "Braddock's Defeat" occurred in the *First, Second, Third, Fourth* of the French and Indian, or Inter-Colonial Wars.
27. The gap in location, age, and ideals between the Northern and Southern colonies was bridged over by the founding of *Del., Md., N. J., N. Y., Pa.*



28. The leadership of John Winthrop was noted in the founding of *Baltimore, Boston, Charleston, Philadelphia, Providence.*
29. The strict Puritan Church of early New England gradually gave way to what has since become known as the *Baptist, Congregationalist, Lutheran, Methodist, Spiritualist* church.
30. The Proprietary form of government was exercised in *Mass., N. Y., Pa., R. I., S. C., Va.*
31. The right of woman suffrage was granted for a time in *Conn., Del., Mass., N. J., Va.*
32. John Berkley and George Cartaret once owned *Conn., Del., Ga., Md., Mass., N. H., N. J.*
33. The Grand Model was drawn up by *Cecil Calvert, King Charles, John Locke, John Smith.*
34. The colony of Maine was once under the proprietorship of *John Davenport, Sir Ferdinando Georges, Anne Hutchinson, William Kieft, Roger Williams.*
35. The welfare of the New York colony was much helped by the very early settlement of the Huguenots at *Albany, New Burg, New Rochelle, Saratoga, West Point.*
36. The first settlement by the Swedes was in *Conn., Del., Ga., Md., Mass., N. C., N. H., N. Y.*
37. William Bradford was once Leader of the *Baptists, Catholics, Pilgrims, Quakers.*
38. The "United Colonies of New England" was formed in *1637, 1643, 1683, 1733, 1774.*
39. The first Newspaper in America was the *Boston News Letter, New York Times, Philadelphia Ledger, Providence Journal, Poor Richard's Almanac.*
40. The most influential professional class in New England were the *editors, lawyers, physicians, preachers, teachers, writers.*
41. The first written constitution in the colonies springing from the people and creating a government was in the colony of *Conn., Del., Mass., N. J., Va.*
42. The Charter form of government was enjoyed by the people of *Del., Ga., Md., Pa., R. I., Va.*
43. Lord Delaware lived in England nearly all the time he was governor of *Conn., Del., N. J., R. I., Va.*
44. The First Representative Assembly held in America was in *1607, 1619, 1620, 1643, 1754.*

Number Right —  $\times 3 =$  — Score

*\*Directions for Administering, Scoring, Using the Results*

## DIRECTIONS FOR ADMINISTERING EXERCISES IN UNITED STATES HISTORY

### TO TEACHERS:

1. These exercises are not intended to be used for testing purposes until the pupils have been formally instructed in the period of history on which the test is based.

2. Endeavor in so far as possible to preserve the normal attitude of mind, both for yourself and your pupils. Let the exercises be presented as an integral part of the usual school procedure.

3. Any special coaching, or announcement of the test previous to the hour of giving it is entirely inconsistent with good work in educational measurement.

4. At the time you plan to administer the test ask the pupils to clear their desks and see that their pencils are sharp.

5. Say to them: "Today we are going to find out how well we learned many of the points we studied in our history lessons. I shall give to each of you a folder in which are some exercises to be worked out. You may look at the first page, but no more, until I give the signal to start working."

6. Distribute the tests by placing on the first desk of each row sufficient copies to supply the pupils of the row.

7. When each pupil has a copy, direct everyone to fill in the blank spaces at the top of the first page.

8. After the blanks have been filled out, say to them: "You may now look at the first illustrative exercise on the front page. Read it over silently as I read it aloud."

'1. Columbus discovered *Africa, America, Asia, Australia, Europe.*'

"There are several suggested answers, only one of which is correct. That one is, of course, *America*. Draw a heavy line clear around it. This exercise is now worked out and may be read as a correct historical statement, Columbus discovered America."

9. "Look at the next exercise. It reads, 'The New World was discovered in the year 1000, 1453, 1492, 1497, 1565.' Draw a line around the date 1492. The correct historical statement is, The New World was discovered in the year 1492."

10. "Now look at the third illustration, 'The first man to sail around the world was *Balboa, Cortez, DeSoto, Drake, Magellan.*' Draw a line

\*Reproduced from Manual to Teachers, title page omitted.

around the word Magellan. What is the correct historical statement on which this exercise is based?" Let some pupil read it.

11. "All the other exercises in this test are worked out in the same way, that is, by drawing a line around the right one of the several suggested answers."

12. "Try to work out each exercise whether you are sure of the right answer or not. Select the one which you think is right and draw a line around it. There is always *one* correct answer in each exercise."

13. "The time limit is given on the test. This is plenty of time if you work steadily and do not look around."

14. "Does every one understand clearly just what we are going to do?"

15. Take the time and trouble to answer any questions relating to the directions for working, if there be such.

17. At the end of the time limit say, "STOP! I shall now read the right answers and you may correct your own papers. Place an X before the number of each exercise you missed. Do not mark the correct ones."

18. Read the exercises as correct historical statements slowly and distinctly. No erasures are permitted.

19. At this point pupils often ask very good questions. It is a psychological moment to drive home facts that have been forgotten.

20. When the pupils are satisfied that all the errors have been marked, direct that the papers be passed forward, and collect them.

### SCORING

1. Each exercise is counted as wholly correct or incorrect.

2. An exercise not tried is counted as wrong.

3. Each correct exercise has a value of:

2 in Test A

1 in Test B; Part I

3 in Test B; Part II

4. A pupil's score is the sum of the values of the exercises worked correctly. Note the formula at the bottom of each list of exercises.

5. The purpose of letting the pupils mark their own papers is to call attention to their own errors. These marked errors also assist the teacher in scoring. If the class is a reliable one only those papers need to be reviewed carefully which show an unusually high or low number of errors. Or such a class may score their own papers.

### USING THE RESULTS

1. The median, or most representative score for the class, may be

quickly found by arranging the papers in order of their scores, and selecting the middle paper. Such medians may be used for comparative purposes.

2. Such comparisons are of little constructive value. Class scores and pupils' scores are only indications of the trend of progress. A larger use for the scores obtained is to find out what specific suggestions they give for the improvement of instruction. These Tests are especially adapted for this purpose thru a study of the errors made by pupils on any given exercise. For the purpose of illustration, suppose that in scoring the papers it was noted that many pupils failed on such an exercise as, "The first man to sail around the world was *Balboa, Cortez, DeSoto, Drake, Magellan.*" List all the suggested answers in a column thus,

Balboa,	Then taking each paper separately tabulate the
Cortez,	number of times each answer was selected. If the
DeSoto,	tabulation is fairly well distributed* among the
Drake,	five, it indicates that most of the pupils have prob-
Magellan.	ably no definite idea of this point; if on the other

hand the majority of mistakes are centered at the word "Drake"† it suggests that many pupils have not cleared up the distinction between the voyages of Magellan and Drake. These are only two of several other possibilities such a study of errors will reveal. But under either condition it is evident that this point needs to be given renewed attention in class.

Having found this specific source of low scores the cause can usually be found; and the proper class procedure to prevent its repetition is generally open to teachers familiar with the laws of learning.

3. It should be noted that all the suggested answers in the exercises are conservative historical material, and may be used for rapid review work. Some are more important than others but all have an impressionistic educational value. None of the points are worthy material in themselves as such; but as material for constructive thinking on the historical problems of this period, they are worth while.

\*Suppose the class consisted of 25 pupils and the distribution was as in *Illustration I.*

†*Illustration II* shows how the answers would be distributed.

I.—Balboa 1 1 1 1 1 1  
 Cortez, 1 1 1  
 DeSoto, 1 1 1 1 1  
 Drake, 1 1 1 1 1  
 Magellan, 1 1 1 1 1 1

II.—Balboa,  
 Cortez,  
 DeSoto,  
 Drake, 1 1 1 1 1 1 1 1 1 1  
 Magellan, 1 1 1 1 1 1 1 1 1 1 1 1

## SCORE SHEET—TEST A

No. of each exercise	Correct Answer
1	MASSASOIT
2	INDIANS
3	1607
4	PENNSYLVANIA
5	PURITANS
6	1600
7	RHODE ISLAND
8	VIRGINIA
9	1619
10	WILLIAM PENN
11	GEORGIA
12	VIRGINIA
13	MARYLAND
14	1620
15	HARVARD
16	PITT
17	ENGLISH CROWN
18	CONNECTICUT
19	BERKELEY
20	SPANISH
21	DELAWARE
22	MARYLAND
23	HUGUENOTS
24	PARIS
25	PENNSYLVANIA
26	TOWN-MEETING
27	FRENCH AND INDIAN
28	TOBACCO
29	PENNSYLVANIA
30	FRENCH AND INDIAN
31	WEST
32	MASSACHUSETTS
33	QUEBEC
34	IROQUOIS
35	STUYVESANT
36	PURITANS
37	ENGLISH
38	CORN
39	CATHOLICS
40	PHILADELPHIA
41	LANDOWNERS

## SCORE SHEET—TEST B, PART I

No. of each exercise	Correct Answer
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1	INDIANS
2	PILGRIMS
3	ATLANTIC
4	INDIANS
5	ENGLISH
6	THIRTEEN
7	DUTCH
8	DEMOCRACY
9	WILLIAM PENN
10	TREE
11	ENGLISH
12	CANDLES
13	INDIANS
14	LOGS
15	EUROPE
16	INDIAN
17	SHIP
18	ENGLAND
19	ENGLAND
20	WALKING
21	JOHN SMITH
22	WILLIAM PENN

## SCORE SHEET—TEST B, PART II

No. of each exercise	Correct Answer
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23	GEORGIA
24	18TH CENTURY
25	LORD BALTIMORE
26	FOURTH
27	PENNSYLVANIA
28	BOSTON
29	CONGREGATIONALIST
30	PENNSYLVANIA
31	NEW JERSEY
32	NEW JERSEY
33	JOHN LOCKE
34	GORGES
35	NEW ROCHELLE
36	DELAWARE
37	PILGRIMS
38	1643
39	BOSTON NEWS LETTER
40	PREACHERS

41	CONNECTICUT
42	RHODE ISLAND
43	VIRGINIA
44	1619

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SEC. 2.—*Value of the Standardized Exercises.* After standardized testing material is organized into as easy a form as possible, it is pertinent to inquire into its educational value. Supposing that a class is tested and the scores tabulated, what really is shown? More specifically, when such measures as Test A and Test B are given to pupils, what is measured?

The answer to this question has been volunteered without mention of it by several teachers who have just become interested in educational measures. Immediately the idea is offered that these particular tests reveal pupils' ability in verbal memory of historical facts and in this ability alone. In other words, the responses are mechanical. Such an evaluation of these tests can not be supported either by a logical analysis of the exercises or case studies of pupils at work on the tests.

When an analysis of an exercise is made, it shows that much more than verbal memory may be involved in working out the correct answers. Just because a pupil does not write out a long paragraph in the selection of the correct one of the several suggested answers, does not justify the position that verbal memory only was employed in arriving at a decision. In order to respond with such a simple answer as *yes* or *no* to a given query may involve associative memory, logical selection, imagination, and judgment of the most complex nature. As the writer has watched pupils work, and listened to their thinking out loud in experiments, he is convinced that thinking of a very complex type has often been involved. Take such an exercise as, "The Patroons were Dutch *fishermen, fur traders, landowners, miners, preachers, teachers.*" It was quite possible for these early settlers to have been engaged in any one of these activities except possibly mining. For the pupil whose knowledge on this point is not clear a whole complex of associations and selective judgments may be necessary to arrive at what seems to him to be the logical choice. Since there can be but one accepted answer all the other suggestions must be eliminated. In the eliminating process each answer must be taken up separately and considered in the light

of known facts. They might have been *fishermen* for they settled where water was in abundance, but no facts are known about the manufacture of fish products, or the sale of them direct. *Miners* would not be a good choice for nothing is known of this region as producing minerals of value; *preachers* is certainly not the correct one for nothing is known about the need for a great number of them in a settlement where religion was not the foremost question; *landowners* is the only suggested answer that brings with it any associations whatever that appear sound and so it becomes the logical choice of the lot. Just because all these mental processes take place almost instantly teachers are apt to conclude that the mental process was verbal memory. But the situation is no different from that of the business man who decides momentous financial questions seemingly on the spur of the moment. However, any one familiar with the conditions knows that he has gone through a whole train of thinking before giving his answer. Pupils do just as quick thinking on the playground. Of course it must be conceded that it is just possible that the opposite might occur but it would result from artificial conditions. Pupils are not taught history by the "1001 question and answer" method in schools of the present. The material is well organized and logically presented. Pupils who do the work of the school respond much as they are instructed.

The analysis just given above is not theoretical but illustrative of the kind of thinking which the pupils did whom the writer examined. In general it may be said that when these pupils knew the right answer they expressed it at once, but when they were in doubt they went through a process of logical selection and eliminated one possibility after the other. This was especially true of eighth grade pupils who brought to bear all their historical knowledge about other periods of history, and their knowledge of geography. One typical illustration taken verbatim from a pupil's "thinking out loud" must suffice. The exercise in question was: "The Mason and Dixon Line was established between Pa. and *Del., Md., N. J., N. Y., Ohio.*" "In the south somewhere; not N. Y.; it is east; line runs from east to west; Ohio would make it north and south; it must be between Pa. and Md." Not all the pupils were so fortunate in their process of elimination but it seems clear that there was always some academic basis for the answer chosen.



In further reply to a prior criticism made of the value of this form of testing a comparison of the scores earned by 245 pupils in the Pressey Rote Memory Test and Test III of the History Exercises is offered as more evidence that the criticism cannot be supported. The comparison was made on the assumption that if rote memory was largely involved the same pupils ought to make high scores or low scores consistently throughout in both tests. In other words the scores of pupils in both tests ought to show a high degree of positive correlation. When the scores from each test are tabulated in a correlation table the results are shown in Table XV. An examination of the frequencies at the right and bottom of the table shows how differently pupils reacted in each instance. With but one exception the scores from the memory test range throughout the 20 possibilities; the range of scores in the history test however is but 12. While the distribution of the frequencies in each instance approximates the probability curve the effects of other mental processes at work are clearly evident on the side of history. The absence of correlation is further revealed in the distribution of the scores on the surface of the table. Instead of the scores as a whole running parallel with the diagonal of high positive correlation the tendency is just the opposite. In fact the coefficient of relationship is negligible, being only  $-.06$ . The outcome of this experiment is a more exact basis for the claim that the history exercises here presented test a high quality of thinking when pupils work them out.

In specific answer to the question raised at the beginning of this section as to what Tests A and B really measure, it should be stated again that the original purpose of the tests was to measure only the amount of historical information pupils possess relative to the content of the exercises. How pupils gained their information; what abilities they exercised in working out the tests; why they succeeded or failed—none of these questions entered into the primary purpose of the study. The value of the tests must be judged by the results of their use in actual school conditions. Evidence has been offered to show that the information which pupils produced was not a mechanical process alone as some have supposed. Rather all the evidence points to the conclusion that pupils brought to bear all the mental abilities they possessed in their responses. Whatever information they gave, represented all they had to offer in meeting the requirements of the tests.

## HISTORY

ROTE MEMORY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f	
1												1		1							2	
2																					0	
3																					0	
4																					0	
5											1										1	
6																					0	
7								1	2						1						4	
8								1	1	1	1	2	1	1	1						8	
9								2	1	1	2	6	2		2		1				17	
10								1	3	3	3	5	1	4	1						21	
11							1	1	3	5	2	8	3	4				1			28	
12								2	10	6	9	4									31	
13								2	5	9	4	6	5	3			1				35	
14								3	5	7	4	9	7	1	2						38	
15								1		5	4	5	1		1						17	
16								1	2	8	2	3	2			1					19	
17							1	3	2	2	2	2	4								16	
18											2	3		1			1				7	
19														1							1	
20																						
										2	3	16	26	55	40	47	34	13	5	3	1	245

TABLE XV

Showing correlation between the Pressy Rote Memory Test and History Test II

Another point in this connection has been developed by Buckingham in an article entitled, "A Proposed Index of Efficiency in Teaching United States History" where he calls attention to the self-delusion of teachers and pupils in regard to the use of the so called higher processes in studying history. Instead of discovering certain special relationships in historical knowledge, only information has been employed after all. The examination question may contain such expressions as, "What do you think," "Compare and contrast," "How do you know," etc. Yet the rating of pupils has been based largely on the facts produced.

Van Wagenen has devised scales based upon information and character judgment. He finds a high degree of correlation existing

between the results of these two kinds of tests. Buckingham continued the study of this same relationship and goes so far as to establish an index of relationship between the two sets of tests whereby one can predict the ability in "Character Judgment" scores from the actual scores obtained through the "Information" tests. All the data obtained by this writer point to the validity of using carefully worked out informational tests as measures of historical ability.

In the light of the successive points just given it is clear that the hasty criticism of history teachers mentioned at the beginning of this section is not valid. It is equally clear that the present tendency to get away from insisting that pupils have at ready command a lot of facts and details is not sound. The writer has witnessed teachers insisting that pupils think in the history recitation when as a matter of fact clear thinking was impossible, for the pupils had no facts on which to base their reasoning. This should not be interpreted as a plea for many facts taught in isolation, but it is a plea for teaching many more facts than are now taught, in meaningful connections and to some purpose.

In further support of the issue just raised an abstract is presented of the aims in teaching history as formulated by the New Committee of Eight:

1. Free the mind from the trammels of time and place.
2. Produce open-mindedness.
3. Induce patient inquiry before passing judgment.
4. Give the methods of investigation and tests of accuracy.
5. Develop that form of judgment which deals with the shifting and conditional relations of men in society.
6. Yield high moral and ethical concepts.

These aims deserve the support of every teacher of the subject. In the accomplishment of them more stress must be placed upon the weight of information than is done in practice according to the results of this study. A little consideration of this point impresses one with the absurdity of expecting pupils to think intelligently without a clear definite knowledge of the content of the subject.

SEC. 3.—*Significance of the Value Found for Each Exercise. Four Different Kinds of Historical Material.* It is evident that the values assigned to any of the exercises can be modified by departing

from the standardized conditions of the present. All that is claimed for these values is that they represent the relative difficulty, and specific difficulty of these points in Colonial History under the conditions in which they were obtained. In other words, so long as this period of our country's history is presented in schools as it is now, there being no appreciable difference in methods, types of teachers, textbooks, supplementary reading material, hygienic conditions; and the results tested by the means used in this study, and confined to pupils of the eighth grade about to enter the high school,—these values are correct for large groups. This may appear to some readers as apologetic, but no more can be claimed for any standard test in principle. A class of exceptionally bright pupils; a selected class which has unusual interest in historical studies; or a teacher who is exceptionally strong in motivating the subject; any of such conditions will modify the values considerably. But such conditions are not applicable to the general run of history classes as one finds them in the public schools of today. Only unselected pupils, unselected teachers and unselected material were considered in obtaining the values here presented.

Because the responses came from eighth grade pupils about to enter the high school, and in most instances these same pupils had completed this part of history a year previous to the test, the writer is led to conclude that the work of these pupils represents approximately the net tangible results of the history instruction relating to the facts usually taught in schools. If there is any inherent differentiation in types of material it ought to appear after the immediate advantages of drill and the factor of recency have been minimized. If this conclusion is valid the next point is of special interest.

The weighted values of the exercises in the various tests indicate that there are approximately four types of historical material of an informational character now taught in the seventh grade relating to the Colonial Period. Table XVI was made up from the results of Tests I, II, III, and Lists X and Y, and the sigma values in Table XIV.

TABLE XVI  
CLASSIFICATION OF EXERCISES ON BASIS OF CONTENT

<i>Political</i>	Values
Mason-Dixon Line	2.46
Grand Model	3.49
Proprietary Government	3.03
Charter Government	3.03
First Representative Assembly	3.43
Ownership of N. J.	3.39
Philadelphia a Political Center	2.46
First Written Constitution	3.49
Town meeting of New England	2.76
Treaty of Paris 1763	3.04
Pitt in English Parliament	2.38
Woman Suffrage in N. J.	3.05
Lord Delaware Governor of Va.	3.12
<i>Dates</i>	
Slavery introduced	2.26
Landing of Pilgrims	2.37
Settlement of Jamestown	2.05
Period of Colonization	2.50
United Colonies of New England	3.35
Last colony founded (century wanted)	3.08
<i>Religious</i>	
Decline of Puritan Church	3.33
Quakers founded Pa.	1.95
Witchcraft	2.12
Toleration Act of Md.	2.77
Huguenots settled Charleston	2.77
Puritan persecutions in Mass.	2.28
First settlement of Catholics	2.34
<i>Social</i>	
City of Brotherly Love	1.41
English most numerous nationality	1.64
Indians the first inhabitants	.51
Dutch settled in New York	1.37
Harvard College	2.37
Poor Debtors of Ga.	2.29
Emigration Westward	1.94
First houses of logs	.73
Pilgrims came from England	.82
Unexpected attacks of Indians	.77
Common means of travel	1.23
All the colonists from Europe	1.08
Pocahontas an Indian girl	1.22
Candles gave light at night	1.97
Colonists all under English control	.97

From the above it seems quite clear that teachers of history need to give more attention to skill in teaching political matters than is now devoted to them. Nine exercises referring to political events were found whose value is 3.00 sigma or above. It is the exception to find such content having a value of less than 2.50 sigma. All the dates in the tests have a value 2.25 sigma except that referring to the settlement of Jamestown and that is above 2.0 sigma. Religious events are about as difficult to learn thoroughly as dates. The median value of social events given in the table is 1.23 sigma. This feature of the study points to the fact that teachers may profit by a careful analysis of the material of instruction, and then stress each type in proportion to its relative difficulty in learning for permanent retention. One may profit in a most practical way by a knowledge of the fact that different kinds of material show corresponding degrees of inherent difficulty for learning and teaching.

The weighted values also indicate that teachers need to be more specific in what they expect pupils to learn, or need to teach pupils methods of inference in thinking. Just because pupils are taught that the Mayflower vessel started from Plymouth, England, and that the Atlantic ocean is between North America and Europe, is no guarantee that pupils will work correctly Exercise 4 which was included in List Y, "By the time the Mayflower had arrived at Plymouth Rock it had crossed the *Atlantic, Antarctic, Arctic, Indian, Pacific* ocean." Approximately 6% or 148 pupils failed on this point which seems so easy that every one would be successful. The preceding exercise in the same list illustrates the same point. This reads, "Every one of the colonies was founded by men from *Africa, Asia, Australia, Europe, South America*." It is not likely that such a specific question as this is ever asked by teachers. The matter is just taken for granted that pupils know such facts from the other facts they have been taught. However, when enough pupils fail on such a simple point to make five good sized classes, it is evidence that all pupils can not be trusted to make inferences safely without training.

To know the points just referred to above pertaining to the different types of material, and the need for specific training in inference is alone worth all the effort of this investigation. They

are an outgrowth from the primary purpose of the study but none the less valuable. Standardized tests and scales are valuable in school administration, but the interpretation of them is the most important element. They need to be scrutinized in the light of all that is known about the principles of Education, its history, its administration and the psychology of learning. The results of their use is but the beginning of thinking; not the time to record scores and pass to something else. The scientific educator of the future will think of his instruction material much as the physician does of his medicines. He will not prescribe previous to an intelligent diagnosis.

SEC. 4.—*Possible Uses of the Standardized Exercises.* These tests and scales are submitted to teachers and supervisors as convenient standardized testing material for finding out how much information a pupil or a group of pupils has concerning the details of the Colonial Period of American History. If administered in standard form it can be ascertained in the time of a single class period or less, just what facts any pupil knows or does not know well enough to use immediately. There can be no question about the issue on the part of any pupil, parent or teacher about the results,—they are all objective.

They may also be used for rapid review work, after the usual instruction is given, as all the facts usually presented in an elementary course are included in the measures.

They may be used also for comparison of the results of instruction by schools and by grades. It would seem that seventh grade pupils just completing this period, or eighth grade pupils who have just reviewed the work ought to make higher scores. In so far however as seventh grade pupils were tested they did not make higher scores. When tested side by side the eighth grade pupils made the better scores. It may be that the maturity and increased skill of the latter in reading, judging, and taking tests gave them an advantage which offset the disadvantage of the lapse of time since studying these facts.

An equally useful purpose is served by these measures when they are used by teachers to diagnose the deficiencies in individual cases, or classes. The beginning of the information needed in

diagnosis is afforded by a tabulation of the errors. This may be done in the time of a single class period by the assistance of pupils in some such form as here given.

TABULATION OF WRONG RESPONSES MADE BY 150 PUPILS  
TAKING TEST I

1. Mayflower		7. Witchcraft	
chapel		Baptists	6
hall		Catholics	34
hotel		Dutch	20
plant		Indians	19
queen	1	8. Owners of New Jersey	
2. Standish		Conn.	11
Dutch	28	Del.	30
Puritans	50	Ga.	12
Swedes	3	Md.	15
3. Williams		Mass.	18
Ga.	15	N. H.	14
Md.	17	Pa.	10
Mass.	28	9. Native food crop	
N. C.	1	barley	1
N. J.	6	oats	6
Pa.	7	potatoes	21
S. C.	3	rice	14
Va.	4	rye	3
4. Patroons		wheat	28
fishermen	18	10. Mason-Dixon Line	
fur traders	58	Del.	47
teachers	0	N. J.	7
preachers	16	N. Y.	2
5. Hooker		Ohio	18
Del.	35	11. Bacon's Rebellion	
Ga.	16	Argall	3
Md.	15	Andros	31
N. J.	11	Dale	2
N. Y.	5	Minuit	7
6. Harvard		Winthrop	28
Brown	3	Yardley	3
Penn	7	12. Charter Oak	
Princeton	9	church	6
W. and M.	38	meeting house	23
Yale	16	painting	3
		school	0
		town hall	10



13. Grand Model		Md.	16
Calvert	22	Mass.	15
Charles	35	N. C.	5
Smith	57	N. H.	20
		N. Y.	17
14. Most numerous nationality		21. Slavery introduced	
Dutch	43	1607	21
French	6	1620	29
Germans	4	1643	6
Irish	0	1683	7
Scotch	3	1775	10
Swedes	4	1787	15
15. Proprietary colony		22. New York founded	
Mass.	36	English	27
N. Y.	17	French	5
R. I.	22	Spanish	4
S. C.	7	Swedes	0
Va.	23		
16. Professional class		23. Tobacco in Virginia	
editors	19	corn	11
lawyers	30	cotton	50
physicians	8	indigo	7
teachers	9	rice	3
writers	33	wheat	4
17. Toleration Act		24. "Great Treaty"	
Episcopalians	4	Berkley	7
Puritans	46	Endicott	0
Quakers	62	Mather	0
18. Oglethorpe in Ga.		Smith	9
Conn.	36	Standish	12
Del.	22		
Md.	8	25. Pocahontas saved Smith	
N. J.	5	Berkeley	3
S. C.	8	Edwards	1
Va.	15	Penn	11
19. Massasoit welcomed Puritans		Rolfe	11
Canonicus	3		
Philip	17	26. Charter government in	
Powhatan	48	Del.	33
20. Swedes in Delaware		Ga.	7
Conn.	16	Md.	13
Ga.	10	Pa.	26
		Va.	38

27. Huguenots in Charleston		Catholics	19
Baltimore	19	Quakers	58
Boston	28		
New York	10	35. Catholics' first settlement	
Philadelphia	21	Conn.	14
28. Plymouth Rock in		Del.	12
Conn.	23	Mass.	18
Del.	17	N. C.	6
Md.	9	N. H.	4
N. J.	5	N. J.	5
N. Y.	1	R. I.	31
Pa.	4		
R. I.	20	36. Jamestown founded	
S. C.	1	1619	4
29. Pilgrims came in		1620	24
1607	51	1643	18
1619	12	1733	21
1643	6	1754	8
1683	6		
1776	2	37. First Newspaper	
1789	2	New York Times	28
30. Claiborne's Rebellion vs.		Philadelphia Ledger	5
Berkeley	33	Poor Richard's Al.	83
Brook	8	Providence Journal	7
Delaware	12		
Say	9	38. Log houses	
31. Indentured servants in		brick	5
Del.	8	cement	0
Ga.	29	dirt	6
Pa.	3	marble	1
S. C.	37		
32. Andros represented		39. Last colony	
Continental Congress	37	Conn.	8
Proprietors	12	Del.	5
Common people	41	Md.	4
33. First Rep. Assembly		Mass.	5
1607	14	N. C.	6
1620	13	N. Y.	6
1643	24	Pa.	6
1754	58	S. C.	22
34. Bradford leader of		R. I.	17
Baptists	22	Va.	5
		40. Emigration westward	
		east	29
		north	12
		south	14

41. Last Dutch Governor		46. Quakers persecuted	
Hudson	32	Baptists	24
Minuit	4	Methodists	10
Winthrop	17	Moravians	13
Yeardley	8	Reformed	36
42. Germans in Pennsylvania		47. Georgia invaded by	
Md.	17	Dutch	45
N. J.	16	French	34
N. Y.	39	Irish	2
R. I.	9	Swedes	8
S. C.	7		
Va.	1		
43. City of Brotherly Love		48. Gorges control'd Maine	
Berkeley	1	Davenport	38
Calvert	7	A. Hutchinson	45
Endicott	7	Kieft	8
Smith	6		
Standish	18	49. "Holy Experiment"	
44. Important Colonial War		Wm. Bradford	17
Queen Anne	16	Wm. Brewster	15
King George	16	J. Leisler	2
King William	16	Minuit	23
45. Government, form desired		50. Natives of America	
aristocracy	4	Caucasians	2
autocracy	9	Chinese	0
monarchy	20	Malays	2
oligarchy	4	Negroes	3

These tabulations represent the actual responses of 150 pupils selected from 15 different schools taken at random. It reveals in an objective way how far short and indefinite is the aim to inform pupils accurately on some of the more commonly accepted points in the early history of our country.

Such a table as the above may be easily made up by placing on the blackboard all the suggested answers to each exercise, and then call for a show of hands when any point is taken up. Suppose the exercise referring to the date of the landing of the Pilgrims were considered.\* The teacher would ask, how many find 1607 as

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\*After pupils had scored their own papers.

the date selected; how many found 1776, and so on throughout the whole list. If a considerable number of pupils gave 1607 as the correct answer to this point it is evident that the class as a whole is not clear either as to the settlement at Jamestown or the landing of the Pilgrim Fathers. Both points need to be emphasized anew. But previously it should be the professional work of the teacher to find out why these dates were confused—the cause of the poor scholarship. Having first done this the remedial measures can usually be found. This is the use for which these measures are the most highly commended. They afford a direct, objective means of revealing to pupils and teachers alike the points of strength and weakness. They are shown so specifically that the means for overcoming the deficiencies seem almost self-evident. The check on the correctness of the tabulations was that the total of the reports should in each instance equal 150.

Even with a selected group of superior pupils of the same ability, classified according to the results of an intelligence test, these measures are an aid to the teacher. The sigma value accompanying each exercise indicates the inherent difficulty, and consequently it may be estimated at once whether much or little emphasis should be given. As was pointed out in the preceding section it seems perfectly clear that there are some matters which need to be more skillfully taught than teachers have been heretofore aware of.

## CHAPTER VII

### SUMMARY AND CONCLUSION

In the preceding chapters have been given the purpose and method of this study in detail, and a discussion of the results for educational purposes. In concluding the work, the whole study may be summed up and evaluated as follows:

#### SEC. 1.—*Summary*

1. The primary purpose of this study was the derivation of standardized measures for testing the historical ability of pupils in the elementary schools.

2. Four such standardized measures were found possible: Scales C and D and Tests E and F.

3. The content of these standardized measures is confined to informational material taken from the Colonial Period of United States History.

4. All of the informational material usually included in an elementary course of study on the period considered has been standardized.

5. The content is incorporated in the form of exercises wherein the pupil must choose the correct one of several suggested plausible answers.

6. The standardization of the exercises was based upon the performance of eighth grade pupils approximately one year after studying the Colonial Period.

7. A method of procedure for standardizing testing material has been presented.

8. Finally there is given a discussion of the use of the standardized measures for supervisory purposes. The outstanding points in this chapter are: a reorganization of all the exercises into Test A and Test B, Part I and Part II with full directions for administering, scoring, using the results; the value of the exercises; four types of historical material; and suggested means for using the exercises to discover clues for improving instruction.

SEC. 2.—*Conclusions*

1. All the evidence of this study clearly shows that it is possible to standardize all the testing material in the content subjects. The difficulty exists in devising a form for the material which admits of objective scoring.

2. Many more scales and tests similar to the ones here presented are needed in order that the results of instruction in each period or particular phase of United States History may be tested.

3. The Standardized Exercises presented as a result of this study are reliable and will continue to be reliable measures until there is a decided change in the standard conditions under which the Colonial Period of United States History is taught.

4. The results of this study indicate that abundant historical material is presented to pupils but little recognition is given to the ease or difficulty which pupils experience in learning the different kinds of material.

5. The tendency to depreciate the value of learning thoroughly much informational material in United States History can not be supported. Much well organized information is needed for constructive thinking if the new aims of teaching history are to be realized.

6. The scales and tests here presented may be used to determine both the achievement of pupils, and the remedial measures needed to improve instruction.

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